

PRACTICAL OBSTETRICS

ERNEST HASTINGS TWEEDY
AND
G. T. WRENCH



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THIRD EDITION

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PRACTICAL OBSTETRICS

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PRACTICAL OBSTETRICS

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1912

PREFACE TO THE THIRD EDITION

THE publication of this edition has afforded me an opportunity of completing the statistics of the Rotunda Hospital obtained during the seven years of my Mastership.

It has also permitted me to set forth my personal views on eclampsia, which I have done in the Appendix, by publishing a reprint of my paper read before the Obstetrical Section of the British Medical Association, 1911.

The Appendix also contains observations by two of my former Assistant Masters on scopolamine-morphine in labour; and in addition a detailed account of the treatment of acute sepsis by vaccines.

E. HASTINGS TWEEDY.

1912.

PREFACE TO THE SECOND EDITION

THE favourable reception accorded to this work and the rapid exhaustion of the first edition have been sources of great satisfaction to the authors. It has justified them in their belief that a book dealing almost entirely with the practical aspect of obstetrics would be appreciated alike by those actually engaged in practice, and by students preparing for examination.

The book has not been free from the errors which are found too frequently in first editions. These arose mainly from the unavoidable separation of the authors for some time before its completion. It is most satisfactory to know that these errors are now corrected, and to feel that the present work can claim to be fully representative of the Rotunda Hospital methods.

Not only has Dr. Wrench taken an active part in the authorship, and afforded his personal co-operation in the completion of this edition, but a further advantage has been secured in the aid of Dr. J. R. Freeland (M.D. University of Pennsylvania), one of my present assistant masters. Dr. Freeland is singularly fitted for the task to which he has so loyally devoted himself. His knowledge of Surgery in its different branches is sound and practical, and in addition he is intimately conversant with the system of Obstetrics practised in the Rotunda Hospital. In the compilation of statistics, correction of inadvertent errors and omissions, and in the accurate description of our methods,

he has shown judgment and critical observation. The authors gladly take this opportunity of acknowledging their indebtedness to him.

The chapters on the toxaemia of pregnancy, uterine inertia, and contracted pelvis have been re-written. Articles on subcutaneous pubiotomy, hysterotomy, and infant digestion have been added, and throughout the book numerous additions of practical utility will be found—in fact, every page has been carefully revised.

I desire to draw particular attention to the articles on uterine inertia, the treatment of contracted pelvis, and rupture of the uterus, as these differ to some extent from the views expressed in the first edition.

Throughout the book the intern statistics of the Rotunda Hospital have been brought up to date and the extern statistics omitted. The reason for this omission is that we know that observations recorded by a number of more or less inexperienced students and by young practitioners are not to be implicitly relied upon. The extern statistics are included in the appendix, and every possible care has been taken to make them accurate.

Speaking for myself, the book is a record of an experience of over 30,000 cases for which I have been personally responsible. In their management my suggestions and opinions were followed as closely as possible.

To those who would differ from the methods of treatment advocated, I plead this large experience and the progressive improvement of results in every direction.

Those who knew the hospital during the master-

ship of Sir William Smyly will recognize the dominant share he has had in moulding our present-day practice. Since his time progress has been to a large extent one of mere development.

To Mr. A. K. Maxwell, of Glasgow, we are indebted for many excellent additional pictures.

E. HASTINGS TWEEDY.

April 1910.

PREFACE TO THE FIRST EDITION

THE requirements of practical midwifery are so inadequately provided for in the curriculum of our Universities and Licensing Corporations that it is not an exaggeration to say that many recently-qualified practitioners are a danger rather than a help to their lying-in patients. For this lamentable result the different Examining Bodies must be held solely accountable, for it is unreasonable to expect a student to pursue knowledge to a greater degree than that which is found necessary for qualification purposes.

The present system has produced men with considerable theoretical, but a small amount of practical, knowledge, and it is for those who find themselves in this predicament that this book has been written.

It does not pretend to compete with the very many excellent treatises on midwifery, but omitting all that is theoretical and not immediately useful to the practitioner, it aims at affording him a concise guide in the elucidation of the many difficulties of Obstetrics.

It has been my constant endeavour to press home to students the practical aspects of Obstetrics, and many of my pupils have expressed a wish that I should publish my lectures in book form. The

exigencies of a busy life made this task impossible, but when my Assistant, Dr. G. T. Wrench, offered to incorporate them in a work dealing with the teaching of the Rotunda Hospital, I felt that I was fortunate in obtaining the services of such an excellent exponent of my views.

We have dealt with conditions likely to arise, and for the most part such as we have ourselves encountered, and in describing them Dr. Wrench has in simple language striven to present them from the standpoint of the practitioner who has largely to rely on his own resources.

It may be that some practical points are not emphasized as they would be in a lecture, but this loss has been compensated for by brevity, and this brevity has enabled the book to be kept within a conveniently small size.

References and authorities have been omitted as having no practical bearing on our subjects, and in describing methods which we ourselves have found successful, we have endeavoured to avoid confusing the reader by placing before him a variety of courses, many of them no doubt admirable, but in our opinion not superior to those described by us.

Much trouble has been taken with our illustrations, and they are, without exception, drawn from original sources.

To Dr. Dawson, our former Clinical Clerk, we are indebted for photographs which, taken from the mannikin, have served as the basis for the drawings which illustrate the application of forceps, and many other operations.

Our thanks are also due to Dr. Paul Carton for permitting us to use his collection of contracted pelves, to my friend, Mr. J. Keogh Murphy, F.R.C.S., for his beautiful specimen of a very early ovum obtained during his term of office as External Assistant here, and for much other help.

Lastly, we must thank our Publishers for the care they have taken in the production of the book.

E. HASTINGS TWEEDY.

ROTUNDA HOSPITAL,
DUBLIN.

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PART I

NORMAL PREGNANCY, LABOUR, AND PUERPERIUM

CHAPTER I

SIGNS, SYMPTOMS, AND DIAGNOSIS OF PREGNANCY

Importance of accurate diagnosis. The importance of the accurate diagnosis of pregnancy is obvious. Its accuracy will always be proved by the event. The doctor is right or wrong. There is no *via media*, as in the rest of medicine, and a mistaken diagnosis cannot be hidden under the shield of the patient's ignorance. Mistakes are final, and condemnation of them not to be refuted.

It is on account of this certainty of issue that the signs and symptoms of pregnancy have been divided into those that are certain, and those that are probable. With the certainty of the information conveyed by the foetal signs, of course, we agree, but we think that the probable signs have scarcely had sufficient significance attached to them. With experience their united evidence brings conviction to the mind of the observer, which is practically as positive as the evidence of a sign due directly to the foetus. But the conviction is the private conviction of the observer, based on his own experience, and he may be unduly cautious in committing himself with his patient, owing to his remembrance of the warnings of textbooks that the probable signs may play him false. We tell our patient she is pregnant, when certain probable signs of pregnancy are well presented, and do not wait for the certain signs, unless some especial gravity is attached to the diagnosis, as when a patient is unmarried and denies or is not

asked whether she has incurred the risk of fertilization. Even in such a case, if it is important that a diagnosis should be given before the abdomen becomes prominent, we give the diagnosis when the probable signs are sufficiently well marked to convince us.

The definite diagnosis of pregnancy depends therefore on—

1. *The presence of signs due directly to the foetus.* These are the foetal heart, the palpation of foetal limbs, foetal movements, and ballottement.

2. *A combination of probable signs.* To elicit these signs a little experience is required, and the positive value of the second group depends on experience. A definite diagnosis of pregnancy cannot be made from symptoms, namely, the things that the patient tells her doctor. But symptoms have their value, for they either arouse suspicion of the possibility of pregnancy or agree with the conviction that pregnancy is present.

AT THE END OF THE FIRST LUNAR MONTH OF PREGNANCY

A woman usually comes to see if she is pregnant before the signs of pregnancy are definite. The symptom that commonly brings her is cessation of menstruation, and she will come a week or fortnight after the expected arrival of the usual monthly period. Conception commonly occurs in the first week after a menstrual period. Taking this date, the patient, when she comes, will have been pregnant for four or five weeks.

What symptoms will she describe? She will say she feels weak, that she has shooting pains in the breast, that she passes her water more frequently, that she has lately felt a little sick in the morning, and that she is constipated.

She may, however, especially if she is a multigravida, have none of these symptoms, and only say she has missed a period.

What to do. If she has come to you for the first time, take down her name, length of married life, number of children, nature of previous labours, symptoms, and address in a book

for future reference. The address is important, for it is very annoying, in the event of a sudden night-call, not to know the exact address.

It is not essential to make a vaginal examination, for little can be learnt at this period. If, however, the patient does not wish to come again, it is better to examine her. There is



FIG. 1. Vaginal examination. Patient in gynaecological chair.

another condition when it is wise to examine, namely, when the last menstruation is described as being very scanty. It is not uncommon for a woman to lose a little blood on one day only at the next expected period, in spite of the fact that she is pregnant.

Therefore under these two conditions—(1) when the patient



FIG. 2. Method of making a vaginal examination, when patient is on a couch or in bed.

does not wish to come again to know if she is pregnant, (2) when there is reason to suspect that she may be more than one lunar month pregnant—ask her to let you make a vaginal examination.

How to make a vaginal examination. The best position is that provided by the ordinary gynaecological chair. Failing this, the patient should lie on her back on an ordinary couch with her knees drawn up. It is a good plan to get her to stay in bed and visit her. Ask her then to lie close to the edge of the bed on her back, to put two pillows under her shoulders, and a bolster under her buttocks, and to draw her knees up a little. She will get into this position herself, while you are washing your hands and your back is turned to her. It is a very good position for bimanual examination, for the abdominal muscles are completely relaxed. Draw a chair up by the side of the bed and pass your finger in between her thighs, opening the lips of the vulva with your other hand. Prevent her watching your hands and satisfy her modesty by putting heaped bedclothes over her chest and flexed legs, to hide her face. It is useless to attempt to make a bimanual examination with the patient lying on her left side. You cannot get the abdominal muscles to relax, nor can you accurately map out the uterus.

Before making a vaginal examination cleanse the orifice of the urethra with a pledget of wool soaked in biniodide of mercury (1-1000) and pass a catheter. Invariable attention to this rule will save you from diagnosing pregnancy or ovarian cyst, when only a full bladder is present. Still better, go out of the room whilst the patient empties her bladder.

It is not necessary to douche the vagina before examination. If she has profuse leucorrhoea, it may be cleaner to do so. If she has a yellow discharge, make note of its presence, carefully douche her, and treat the vaginitis. We wear a rubber glove, or finger-stall, for the habitual use of rubber gloves, which can be boiled, saves the hands from becoming infected with bacteria and carrying them to other patients. With a little practice one can become as skilful with rubber gloves as without them. Wash your hands thoroughly with soap and water and do not dry

them. If the patient is a primigravida pass the index finger into the vagina, first separating the labia with the fingers of the other hand and noting the colour and moisture of the labial mucous membrane. If she is a multigravida pass in the index and middle fingers.

Sometimes the patient is very constipated, with scybala in the rectum. This makes the vagina tender, and pushes the uterus away from the finger. There is often flatulence as well, which prevents you feeling the uterus accurately. Under these conditions desist from examination, give her a purge, and tell her to come again when the bowel has been emptied.

What to feel. In the first three lunar months of pregnancy the uterus has sunk into the pelvis, and so the cervix is easy to feel. Later, when the uterus rises into the abdomen, the cervix rises with it. It may feel a little soft. By bimanual examination, that is with the fingers of one hand in the vagina and the fingers of the other pressing on the abdomen in the direction of the vagina, the uterus will be felt. It may feel a little softer and more spherical than normal, but that is all. You learn nothing positive by vaginal examination. But you do learn that the signs do not contradict the symptoms given by the patient. If, on the other hand, she has made a mistake and the uterus is larger than it should be by her dates, inquire further into the so-called last menstruation, and examine the breasts.

What to tell the patient. If a woman has previously borne children, her own feelings are of value. In a multigravida the symptoms of pregnancy are of more value than in a primigravida, for the former has experienced them before. On the other hand, the signs are not so definite as in a primigravida, for the change from the virgin state to the pregnant is more radical than that due to a repetition of pregnancy.

Tell, then, a multigravida that, although it is too early for you to detect the signs of pregnancy, her suspicions are probably right. Tell her there is no need for her to report again until five to six weeks before full term. All this time the abdomen should be carefully palpated and any

abnormality of presentation rectified. This is usually easy, and though the abnormal presentation may recur, it does not necessarily do so. It is well to examine her urine occasionally during pregnancy.

If, on the other hand, the patient is a primigravida and there are reasons to doubt the existence of pregnancy, ask her to come again in two months' time. You cannot rely on what she says nor on amenorrhoea as evidence of pregnancy. Knowledge of medicine and gynaecology tells you of many conditions, other than pregnancy, which are associated with amenorrhoea. If there is reason to suspect any conditions such as chlorosis, phthisis, haematocolpos, &c., examine for them. Remember, too, menstruation may be delayed or stopped by the nervous effect of the first weeks of marriage, by the desire for a child in a sterile woman, and by many unknown reasons. Lastly, remember a woman may intend to deceive by a false history of menstruation, and may conceal the absence of menses, fearing the dreaded news of her pregnancy. Again, there are other causes of morning nausea and vomiting. For example, they are not uncommon in chlorosis. Therefore, ask the patient to come in two months' time; the probable signs will then be present, and you will no longer have to depend on her symptoms for diagnosis.

AT THE END OF THE SECOND LUNAR MONTH OF PREGNANCY

Can a positive diagnosis of pregnancy be made at the end of the second lunar month of pregnancy? We think it can be, if Hegar's sign is definitely present, or if Hegar's sign is not so definite, but is associated with the presence of other probable signs. The conviction of pregnancy imparted by these signs is a private conviction. In nearly all cases it is wise to tell the patient, but there are certain cases, where the question of a woman's chastity is entailed, when it is wise to withhold a definite pronouncement of pregnancy until one of the direct foetal signs is present.

What symptoms the patient describes. The patient will describe the same symptoms as at the end of the first lunar

month. Nausea, morning sickness, and frequent micturition are more marked, and she may have noticed that her breasts are getting larger. Multigravidae, however, often do not have morning sickness, nor is swelling of the breasts as yet noticeable.

What to do. Ask her, if she is a primigravida, to let you see her chest and examine the breasts. Sometimes it is advisable to examine the breasts covertly, while pretending to listen to the heart, for the patient may not suspect she is pregnant, and, if she is unmarried, it is indelicate to question her.

Breast changes. The breast changes are of positive value in a primigravida, but they have little value in a multigravida. The breasts are larger and firmer than they were, the veins are more prominent, and the areola round the nipple darkens and spreads. These are all comparative signs and, if you have not seen the breasts before, may not be of much value. But the breasts will appear different from the virgin's breasts. One sign, however, is strong evidence of pregnancy in a primigravida. To obtain it, squeeze the breast gently with the hand from the base towards the nipple. As a rule a little clear fluid escapes. This is sometimes found at the end of the second, more often at the end of the third, lunar month. It is a very constant sign in primigravidae, but you can often squeeze fluid out of a multipara's breast when she is not pregnant.

Abdominal sign. Next, if the patient is lying down on the couch, examine her abdomen. The hypogastrium is flat during the first three lunar months of pregnancy, whilst the uterus is a pelvic organ. The sign is not of much value, and if the patient is on the gynaecological couch it is not worth while, after ascertaining the size of the uterus by vaginal examination, to disturb her clothes to look for this sign.

Signs discovered by a vaginal examination. When the thighs are separated, look along the inner surfaces of them and you will very likely see *venous arborization*, as is seen on the beer-drinker's cheeks. They are quite good signs of pregnancy according to Barnes, who attached considerable importance to them.

Next open the labia and notice the *colour of the vulva*. It is a faint violet, like the colour of dusky cyanosed lips. Pass the fingers into the vagina, and in doing so separate the orifice a little and you will notice the *vaginal mucous membrane has a faint bluish tinge*, and small blue varicose veins appear; also that the vaginal mucous membrane is *moist and soft*, and possibly you may feel *pulsating vaginal vessels* in the fornices. The ureters enlarge during pregnancy and can be detected by palpation. The left is

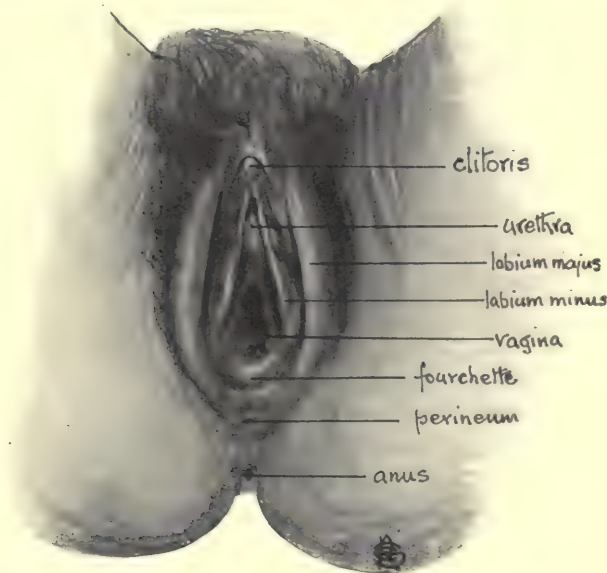


FIG. 3. The vulva.

more often palpable than the right. To feel it, take a point in the median line half-way between the cervix and the urethral orifice; move the finger half an inch to the patient's left and half an inch towards the cervix; by moving the finger from side to side the ureter is felt as a thick cord rolling under it. When demonstrable we consider this a valuable sign.

Next pay attention to the cervix, then to Hegar's sign, and finally to the size, shape, and consistence of the uterus.

We advise this routine method, for unless a routine method is adopted in every case you are apt to overlook one of the signs.

The cervix. The cervix, like the vagina, becomes violet in colour, but it is not worth while to put in a speculum to see, unless you wish to be sure there is no erosion. The softness of the cervix is the most marked cervical sign of pregnancy. Distinguish it from the softness due to an erosion by putting in the speculum and looking. An erosion is often present with pregnancy. The distinction between the softness of pregnancy and that of erosion is not very hard to make. The erosion gives the feeling of superficial softness over a hard core. But there is no hard core to the softness of pregnancy. The softness of pregnancy begins at the os externum, and in later months is shared by the whole cervix. The cervix feels 'boiled through'. If this feeling is made out it is very strong evidence. A good rule is that if the cervix is as soft as the lip, pregnancy is very probable, if the cervix is as hard as the tip of the nose, pregnancy is doubtful.

When softness is well marked, the tip of the finger can be pushed into or dimple the os externum.

Hegar's sign. In the second, third, and part of the fourth month of pregnancy the lower third of the uterus is very soft, compared to the soft, yet firmer cervix and to the main part of the body and fundus of the uterus. The demonstration of this is known as Hegar's sign. There are three ways in which to find out whether Hegar's sign is present or not. (1) Put your finger or fingers in the anterior fornix. Anteflex the uterus with your hand on the abdomen and press the abdominal finger-tips down behind the body of the anteflexed uterus to meet the finger in the vagina. If Hegar's sign is present, although the body feels firm and the cervix firm, yet the middle third of the uterus between them is so soft that it feels no thicker than wet blotting-paper. In fact, you think that the body of the uterus and cervix are two independent tumours, and, you will actually be able to move one independently of the other. (2) The second method: put your finger in the posterior

fornix, turn the anteфлекed uterus straight bimanually, and press your abdominal finger-tips in just above the pubes to meet the finger in the posterior fornix. This is not quite so good a way as the first, because it is hard to get the finger to reach high enough up into the posterior fornix above the cervical tissues. (3) The last method is the best of all, but is disagreeable to the patient, and therefore not often adopted. Pass the index finger into the rectum and the thumb of the same hand to the top of the anterior fornix



FIG. 4. First method of obtaining Hegar's sign.

and pinch the part of the uterus which is just above the cervix between them.

Size, shape, and consistence of uterus. Hegar's sign is made by bimanual examination, so after ascertaining whether or not it is present, proceed to make a careful bimanual examination of the uterus. The uterus at the end of the second lunar month is about the size of an orange. It is anteverted in normal cases. It is more spherical and softer than the non-pregnant enlarged uterus. With care you may be able to distinguish a vertical or oblique ridge

in the wall of the uterus, and near the fundus an area of hardness, called the denser spot. This ridge or furrow is supposed by some authorities to separate the part of the uterine body which contains the ovum from the part that is only unoccupied decidual cavity. The denser part is supposed to be dense because it corresponds to the part of the uterus that contains the ovum. Whether this be so or not, when these signs are felt they are very good evidence of pregnancy.

What to tell the patient. Pregnancy is an attractor of blood to the woman's sexual organs and breasts.

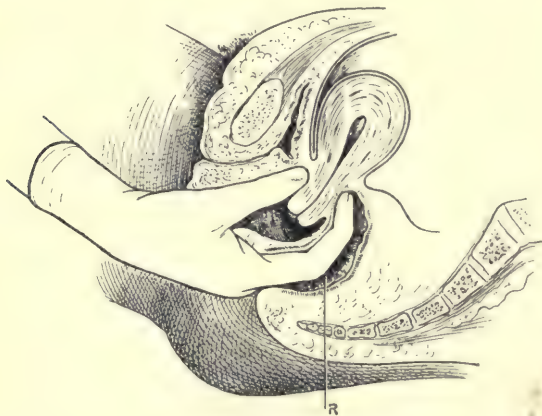


FIG. 5. Third method of obtaining Hegar's sign. R, rectum.

Tumours of the uterus, such as fibroids, also attract blood to the pelvic organs, and sometimes reflexly affect the breasts. Blueing of the vulva, vagina, and cervix, increased vaginal secretions and pulsation of vaginal arteries, thickened uterus and soft cervix, are consequences of the increased amount of blood. Pregnancy, however, is a far greater attractor of blood than uterine tumours, so that all these signs are present in a more marked degree. It is a question then of degree, in comparison, and therefore experience is needed to settle cases in which the signs are not well marked. With pregnancy there is amenorrhoea; with fibroids,

metrorrhagia is very common. Again, all these signs are rapidly progressive with pregnancy, and an increase in intensity is noticed month by month, which is not noticed with fibroids. Hegar's sign, on the other hand, is associated with pregnancy and pregnancy alone. Bearing these things in mind, if Hegar's sign is well marked, tell the patient she is pregnant, unless the question of her chastity is involved, when it is wise, in spite of your own conviction, not to be too dogmatic.

If Hegar's sign is indefinite (as is not infrequent), but in a primigravida you find blueing of the vulva and vagina, soft cervix, and a little clear fluid expressed from the nipple, you will so rarely err in telling her she is pregnant, that you need not mind the risk. Enlarged ureters, the denser spot, and vaginal pulsation, are useful confirmations, but you would not diagnose pregnancy unless the other signs were present. In a multigravida the symptoms help, and these, with the pelvic signs, will indicate whether she is or is not pregnant.

Sometimes none of the signs are well marked. They are all better marked AT THE END OF THE THIRD LUNAR MONTH, and so you may like to defer your opinion until then, or ask her at the first to return at the end of the third, rather than at the end of the second, lunar month. If the signs are not well marked but she has amenorrhoea, do not tell her she is not pregnant.

AT THE END OF THE FOURTH LUNAR MONTH OF PREGNANCY

Early in the fourth lunar month the uterus ceases to be a pelvic organ and rises into the abdomen. Several changes result on account of this. The uterus no longer presses on the bladder, and so *frequency of micturition ceases*. Morning sickness in normal cases disappears. The cervix is pulled up with the rest of the uterus, and so it is more difficult for the vaginal fingers to reach it. The uterus can also be felt abdominally, just above the pubes.

Other signs of pregnancy appear. One is *increased pigmentation*, which is seen best in brunettes. A dark line of

pigment is deposited in the mid-line of the abdomen, dark patches appear about the face, sometimes in a butterfly shape, the so-called pregnancy mask. Other pigment areas of the body assume a deeper tint. This increase of pigmentation is not very important. The other two signs are important. They are intermittent contractions of the uterus and internal ballottement.

Intermittent contractions of the uterus. This is known as Braxton Hicks's sign. The pregnant uterus contracts

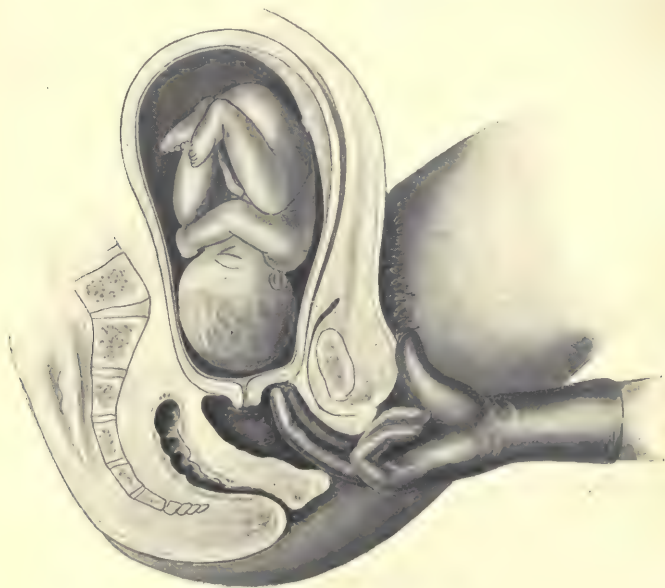


FIG. 6. Internal ballottement.

intermittently. It is stated that the cervix shares in this general contraction. To get the sign, palpate the uterus bimanually. Feel the consistency of the uterus. If you are lucky you will feel the uterus get a little harder as the result of your manipulations. The change is slight but definite, and may sometimes be felt better in one part of the uterus than another. The disadvantage of this sign is that unless manipulations excite a contraction, you may have to wait for twenty minutes for a spontaneous

contraction. If contractions are felt it is very strong evidence, and, with the signs due to increased blood supply and with amenorrhea, are convincing. The contractions increase in strength until they become actually labour contractions. They are therefore particularly useful when examining a woman in advanced pregnancy, in whom doubt has arisen as to whether the tumour is pathological or physiological.

Internal ballottement. Internal ballottement is one of the foetal signs of pregnancy, and therefore a certain sign. It is due to the fact that the foetus is floating freely in liquor amnii. To get it, having passed a catheter, bimanually palpate the uterus. Place one finger in the anterior fornix and steady the uterus against it with the abdominal hand. Then push the finger up with a quick jerk and keep it holding up the roof of the anterior fornix. If a palpable part of the foetus were in contact with the finger, it is suddenly displaced. It floats up into the liquor amnii and returns to the finger that displaced it with a slight tap. This is ballottement. It is sometimes more easily obtained by passing the finger into the posterior fornix. The sign depends on a palpable part of the foetus being in contact with the vaginal fingers. This is not always the case, therefore ballottement is not always demonstrable. If it is you can be quite sure that the patient is pregnant. Ballottement is present in normal cases from the end of the fourth lunar month. After the seventh lunar month ballottement by external palpation is as a rule quite easy.

Quickening. At the beginning of the eighteenth week *quickening* may be felt by the patient. These are the first movements of the foetus that are felt by the mother. They cannot be relied upon for diagnostic purposes in doubtful cases.

AT THE END OF THE FIFTH LUNAR MONTH OF PREGNANCY

The signs, in addition to the size of the uterus, that may be found at the end of the fifth lunar month are (1) Montgomery's secondary areola, (2) foetal heart sounds, (3) uterine souffle.

Size of the uterus. The uterus will be half-way between the pubes and the umbilicus. You will only fail to find it if the patient is very fat and keeps her abdomen very hard. To avoid the latter, palpate gently at first and gradually increase the pressure of the fingers to overcome the tense abdominal muscles. If the diagnosis is important and the patient will not relax, give an anaesthetic. If, when the abdominal muscles are slack, you cannot feel the large uterus, the patient is either not pregnant at all, or the supposed period of her pregnancy is wrong.

Remember, too, when making a bimanual examination, to examine for the other signs of pregnancy. Look for venous arborizations of the thighs, blueing of the vulva and vagina, and varicose vaginal veins. Feel for increased pulsation of vaginal vessels, enlarged ureters, the soft, slightly patulous os, intermittent contractions (making you sure the tumour is the uterus), and demonstrate internal ballottement.

Montgomery's secondary areola. Examine the breasts and you find them enlarged and netted with superficial and varicose veins. Round the nipple are little tubercles, Montgomery's follicles. The pigment area round the nipple is wider and deeper, and outside this area of dense pigment there may be a mottled area of fainter pigment, the secondary areola. It is best marked in brunettes, and Montgomery says it is a certain sign of pregnancy. It is often not present.

Foetal heart. You can hear the foetal heart by listening directly over the uterus, or by using a stethoscope or phonendoscope. Listen over the whole abdominal surface of the uterus. The foetal heart gives a faint tic-tac sound, which is almost too rapid to count. We have never heard it before the end of the fifth lunar month, and are very glad to hear it then. It is, of course, a certain sign of pregnancy. In the later months there is sometimes a 'funic souffle'. This is a sharp, whistling sound, synchronous with the foetal heart-beat, heard in about 15 per cent. of cases. It is due, probably, to some obstruction in the umbilical arteries.

Uterine souffle. There is another sound heard at either side of the uterus, a soft blowing sound synchronous with the maternal pulse. This is the uterine souffle. It is a probable sign of pregnancy, and combines with the other probable signs in confirming your conviction.

REMAINING SIGNS OF PREGNANCY

Size of the uterus. The uterus is at the level of the umbilicus at the end of the sixth lunar month of pregnancy.

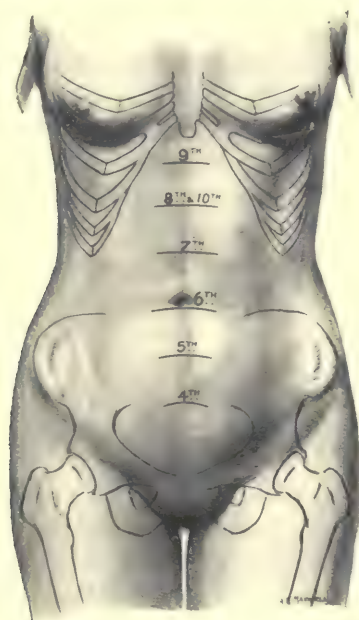


FIG. 7. Height of the uterus at different months.

At the end of the seventh it is three fingers' breadth above the umbilicus, at the eighth half-way between the umbilicus and ensiform cartilage, at the ninth it is up to, or almost up to, the ensiform cartilage, and at the end of the tenth lunar month, owing to the falling down and forward of the womb, it is again half-way between the ensiform cartilage and umbilicus. These positions apply with great accuracy

to primigravidae, but are not so reliable in estimating the time of pregnancy in multigravidae.

Lineae albicantes. The abdominal skin, stretched over the big uterus, shows red patches of stretched skin in the later months. After delivery these become white.

Foetal parts and movements. The detection of foetal parts and movements are final signs of pregnancy, but usually are not detected before the seventh lunar month. To detect them, sit down on the side of the couch upon which the patient is lying. Lay the palms of your hands gently on the abdomen, and, gradually accustoming the abdominal muscles to examination, make little dives with the pads of your fingers. Go over the whole abdominal surface of the uterus. You will feel foetal parts in this way, and may be able to thrust them from the fingers by a sharp push—*external ballotement*; or, by laying the hands on either side of the uterus and pressing down suddenly, you may feel the foetus jerk up in the space between the hands—another method of eliciting external ballotement; or the child may be pushed from side to side. Whilst examining, you may feel or see a part of the foetus move; or, whilst listening for the foetal heart, you may hear the gentle tap of a foetal limb as it against your ear.

SUMMARY OF DIAGNOSIS OF PREGNANCY

At the end of the second lunar month the diagnosis is practically certain if Hegar's sign is present, or if there are several probable signs, such as blue vulva and vagina, vaginal pulsation, enlarged ureter, soft cervix, and breast signs, with amenorrhoea in a married woman.

At the end of the third lunar month the above signs are more marked.

At the end of the fourth lunar month, frequency of micturition, morning sickness, and Hegar's sign cease. The other signs continue, and intermittent contractions of the enlarged uterus, and internal ballotement (certain sign) are manifest.

At the end of the fifth lunar month Montgomery's secondary

areola, the foetal heart (certain sign), and the uterine souffle add their evidence, but are by no means constantly present.

At the end of the seventh lunar month, external ballottement, foetal parts and movements (certain signs) are now present.

The size of the uterus corresponds to the time pregnancy has existed.

Diagnosis of pregnancy complicated by tumours or other conditions. Pregnancy is diagnosed by the signs already given. The aid of gynaecology, surgery, or medicine must be summoned to diagnose any other condition existing with it. One simple point is worth mentioning, namely, that the pregnant uterus, towards full term, flattens out the umbilicus, whereas fat and flatus do not.

Pseudocyesis, a condition of supposed pregnancy, is not uncommon in women who intensely desire offspring, especially sterile women approaching the menopause. Fat and flatus are the most frequent causes. These women often have the symptoms of pregnancy, morning sickness, abnormal or cessation of menstruation, quickening, &c. The diagnosis is made by feeling a normal-sized uterus on bimanual examination or rectal examination, under deep anaesthesia if necessary.

HOW TO PREDICT THE DATE OF THE ONSET OF LABOUR

The patient will ask not only if she is pregnant, but when she is likely to be confined. There are four ways of telling when a woman is likely to fall in labour. The first is by the date of the cessation of the menses; the second, from the time of quickening; the third, by the height of the uterus, and, in the last weeks of pregnancy in a primigravida and the last days in a multigravida, the falling forwards and downwards of the uterus will help.

From the date of the cessation of the menses. Although 280 days is the average duration of pregnancy, this average is rarely accurate in any one particular case. Conception is supposed to take place, as a rule, within the week following the cessation of the menses. Sometimes it takes place between the periods or immediately before the period. What has happened to a woman in one pregnancy

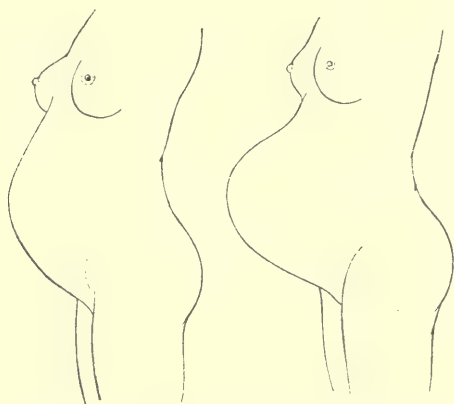
is likely to happen to her in another, therefore if a patient tells us she was a week or more too early in a previous pregnancy, we are accustomed to deduct a similar period of time in calculating the duration of her present pregnancy. It is usual to add seven days to the first day of the last menstruation and count back three months. By personal experience we have found that this is too early a date, in the majority of instances, and have adopted the following rule. We take the date of the last day of the last period, add seven days to it and count back three months. For example, if the last day of the last period was January 3, the addition of seven days makes January 10, and counting back gives October 10 as the probable date of the onset of labour. This rule gives 280 days for nine months of the year, and the difference in other months or in leap year matters little, for 280 days is only an average. We find these predictions as accurate as if we decided by more elaborate tables. For all that, the prediction may be a fortnight too early or a fortnight too late. For this reason, if patients are coming up from the country to be attended, it is advisable to ask them to come up a fortnight before the calculated date.

Quickening. Quickening most commonly occurs in the eighteenth week. Add twenty-two weeks or five calendar months to the date of quickening. For example, if quickening occurred on June 4, labour may be expected about November 4.

The height of the uterus. The height of the uterus at different months has already been given. If the three reckonings from the cessation of menses, quickening, and the height of the uterus agree as to the date of labour, it is well. But if they do not agree, rely principally on the reckoning from the height of the uterus.

Falling down and forward of the uterus. This is probably due to dilatation of the lower uterine segment providing new space for the liquor amnii, with consequent descent of the fundus. This occurs about three weeks before the onset of labour in a primigravida, and about three days before labour in a multigravida. It is, therefore, especially useful in a primigravida who is a month wrong in her calculations.

Whether the uterus has fallen or not is recognized by placing the palm of your hand on the fundus. If the uterus has fallen down and forward, the fundus forms a definite shelf on which your hand can rest, and this is very different to the gradually receding fundus, over which you cannot fit your hand like a cap before the uterus has fallen. Before it has fallen, the large uterus of the ninth lunar month constrains the action of the diaphragm, and may cause the patient difficulty in breathing. She may have to be propped up by pillows at night. Falling down relieves this, and she will



Figs. 8 and 9. Falling down and forward of the uterus.

say that she can now breathe freely at night, but that—and this is owing to the sinking of the uterus into the pelvis—she has to pass her water more frequently, has pain in her legs, and sometimes oedema, greater difficulty in moving about and getting in and out of bed. Rely chiefly on this occurrence of sinking of the uterus in primigravidae. It is often not definite in multigravidae.

What advice to give to the patient in addition to telling her that she is pregnant. She will ask what to do whilst she is pregnant.

One fact of practical experience is to advise her not to tell her friends until nearly the end of pregnancy. We have known primigravidae to be terrified by the injudicious gossip of their friends.

Women who have social functions to carry on often wear tight corsets. Tight corsets press on the swelling abdomen below and the swelling breasts above. Therefore tell her not to wear her corsets at all tight. If she can go to the country so much the better, for there she can walk about unobserved.

As for the hygiene of pregnancy, the ordinary regard to what is healthy is more necessary than at other times. Fresh air is necessary and walking is good. Let her have plenty of fresh air in her sitting-room and sleep with her window open. Let her take gentle but not fatiguing exercise, as bicycling or riding. 'What is she to eat?' she will ask. Answer her that she can eat anything that she can digest, but only at meal times. Do not let her destroy her natural appetite by drinking milk between meals. She must not eat too much, for pregnant women are apt to eat too much 'to keep their strength up'. If she becomes peevish as regards her appetite, order her plain, wholesome food and have done with her caprice. Alcohol can never be called a necessity for pregnant or non-pregnant women.

She will do well to take a daily tepid bath.

Toxaemia is the commonest cause of pregnancy troubles. To avoid the collection of toxins in her system, tell her to drink at least two pints of water a day: when she rises and before bedtime are good times to drink a large tumbler of water. Above all, tell her to keep her bowels open once a day. Senna, cascara sagrada, Apenta water in the morning, or the hospital sulphate of iron and magnesium sulphate mixture are all good laxatives.

For the examination of the urine during pregnancy, see p. 151.

To harden the skin of the nipples, tell the patient to bathe them with Eau de Cologne or other alcoholic solution, night and morning, for the last two months of pregnancy. If the nipples are depressed, they should be drawn out with clean fingers whenever they are bathed. It is sometimes preferable to press the tissues of the breast away from the nipple, which can be done with an ordinary umbrella ring.

CHAPTER II

THE MINOR AILMENTS OF PREGNANCY

Morning sickness. Morning sickness is common in women between the first and fourth lunar months of pregnancy.

The patient either feels sick or actually vomits as soon as she gets out of bed in the morning. Treat her by telling her to take a meal of tea and toast before rising. This will often allay the sickness. It is very important that she should have her bowels opened daily and drink freely of water. If the sickness does not stop, give her light diet and some gastric sedative, such as Sodii Bicarbonatis gr. xv, Spir. Ammon. Aromatici ℥xx, Inf. Gentiani ad ʒj, three times a day half an hour before meals; or give her Bismuth Oxycarb. (gr. xxx) suspended by Pulv. Tragacanth. Co., or Pepsencia. If the sickness become troublesome, make a vaginal examination. Erosion of the cervix or a displaced womb seem to have the power of causing severe morning sickness, for with their cure the sickness sometimes ceases.

Vomiting that makes the patient ill comes under the head of hyperemesis, and is one of the serious diseases of pregnancy.

Varicose veins. These are especially apt to be troublesome in multigravidae. The treatment is the usual surgical one, namely, to keep the legs bandaged, bandaging from below up, and rest with the legs elevated. Either use a Martin's bandage with long tapes, which are wound round the bandage after you have applied it, crossing and recrossing from above down and tied at the ankle; or better, use a crêpe bandage. A Martin's bandage must be washed every night. Lastly, show the patient how to bandage a pad of lint or a roll of handkerchief over the vein, so that she may stop the severe haemorrhage, if the vein ruptures.

Pruritus. Pruritus of the vulval region is common. It may be due to haemorrhoids, vaginal discharge, venous stasis, pediculi, or diabetes.

Treat the haemorrhoids just as when they occur apart from pregnancy, with the exception that operation is contraindicated. Treat, too, any purulent vaginitis, as it is essential to get rid of purulent vaginitis before the onset of labour. The profuse leucorrhoea from which some women suffer during pregnancy is a fruitful cause of pruritus. Prescribe lead lotion ($\frac{3}{4}$ ss. of the Liq. Plumbi Subacetatis Fort. to the pint of water), and tell her to wash the parts night and morning with soap and water, to bathe with the lotion, and finally to dry herself and powder with Violet powder or with a powder composed of Boric Acid one part, Zinc Oxide three parts, and Starch six parts. Resinol ointment, or an ointment containing menthol or tar, is often efficient, and by its greasiness protects the parts from perpetual moisture. Do not advise douching, unless the irritation is unbearable, for douching has some tendency to produce a miscarriage. A woman douches herself with a nozzle and douche-can, placed about $1\frac{1}{2}$ to 2 feet above her hips. She can best douche herself when reclining in a warm bath. She can also use a large glass syringe, which should be boiled daily. She douches herself with solution of borax, one drachm to the quart, in water.

If the itching is mainly due to venous stasis, order her to take sitz baths, to wash herself with Ichthyol soap and after drying to rub in some Pazzo's or Resinol ointment. When the leucorrhoea and the pruritus have ceased, stop the treatment.

Rectocele and Cystocele. Prolapse of the vaginal walls, rectocele and cystocele may cause constant discomfort during pregnancy from moisture, pruritus, and frequent micturition. Inserting a ring pessary and changing it every month is the proper treatment.

Toothache. If we detect bad teeth in the early stage of pregnancy, we advise the patient to go to the dentist, for her teeth are very likely to pain her and give her neuralgia. It is always well to look for bad teeth. If the patient gets

toothache in the latter half of pregnancy, unless the pain is very severe, palliative methods are to be used.

Sore gums and salivation. Both may annoy the patient. A tooth-powder and tooth-brush used frequently with an astringent mouth-wash, such as Alum gr. x to the ounce of water, or a solution of peroxide of hydrogen, may allay these nuisances. You can give belladonna for the salivation, but it is a symptom of toxæmia, and cannot be relieved until the cause is removed.

Headache. Headache is commonly due to constipation. It will be dealt with under the toxæmia of pregnancy.

Cramps. Pregnant women not infrequently suffer from cramps in the thighs and calves. These also seem to be connected with the toxæmia of pregnancy, and must be treated on the lines there given. In the last month of pregnancy an additional reason for cramp is the increased pressure in the pelvis due to sinking of the child. From this form the patient is greatly relieved by lying down frequently and by supporting the uterus with an abdominal belt.

Flatulent dyspepsia. Heartburn. These are not uncommon in pregnant women. Attention to the general hygiene and a gastric tonic medicine will give relief.

Finally, do not let the patient take too many medicines. Women are very fond of taking medicine for trifling ailments.

CHAPTER III

THE OBSTETRICAL KIT

The bag and its contents. In choosing a bag, choose a large one that will conveniently hold all the things needed. A cowhide bag that remains open by stays is the best. It should have an inside lining, which can be taken out and boiled, for it is difficult to keep a leather bag clean unless this is done.

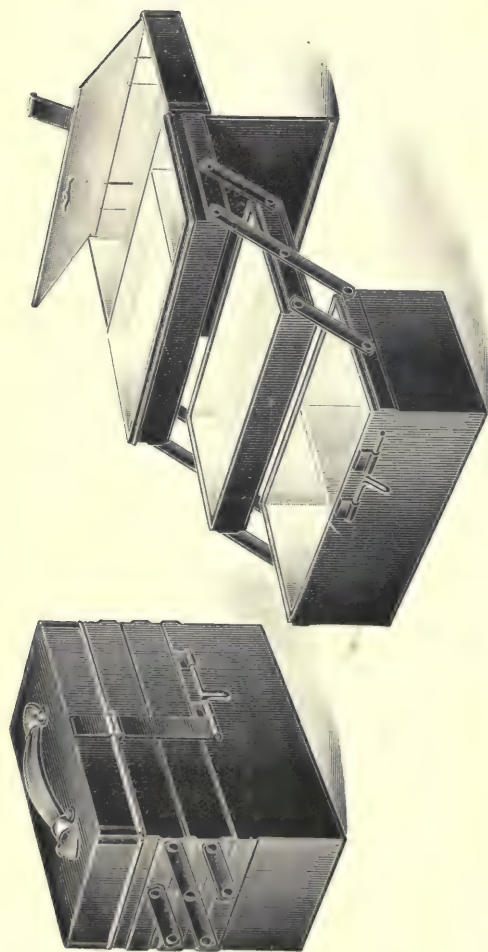
Some obstetricians carry their outfit in a large sterilizer with a cover that fits over it. It contains a spirit lamp with three flames. They are able to sterilize their instruments at the bedside, and this would be ideal, were it not that the water takes some time to boil. This delay is the chief objection to this method of carrying and preparing the instruments. In a case of emergency, time may be lost upon which the safety of the patient depends, for sometimes the water takes more than a quarter of an hour to boil.

We prefer to carry the instruments, already sterilized and wrapped in sterile cases, in a cowhide bag. The bag is also lighter than the sterilizer, and can be strapped on the carrier of a bicycle.

[One of us has adapted a Samway's staircase bandage box (16 in. \times 6 in. broad and 11 in. deep) as an obstetric case. The divisions are taken from the two upper tins. These tins are cleaned by wiping them out with Mercuric Sublimate Solution (1-1000). A sterile towel, boiled, then dried in the oven and ironed, is laid out on the floor of the second tin of Samway's box. The instruments are boiled in weak soda solution in a sterilizer. They are taken out and thrown straight into this towel, which is then folded over them. They dry by their own heat and do not rust. The upper tin or lid is closed. All the instruments which are likely to be needed at a difficult case are thus wrapped in a sterile towel and shut up in a clean tin, which never need be opened at a normal case. In the third tin, spare instruments are



Fig. 10. The bag and contents. The contents are, from left to right: 1, rubber glove and batiste bag; 2, Rotunda douche in bag; 3, soap and soap-dish; 4, chloroform mask; 5, dusting powders in box; 6, nail-brush; 7, needle-holder; 8, biniodide of mercury tablets; 9, catgut in tube; 10, packet of binder-pins; 11, bottle of lysol; 12, bottle of chloroform; 13, bottle of eucalin; 14, hypodermic case; 15, perineal and cervix needles in box; 16, pocket lancet; 17, solids of sodium chloride; 18, catgut in tube; 19, waxed thread for tying the cord; 20, Dührssen's tin; 21, case for chloroform bottle; 22, breast-infusion apparatus; 23, packet of absorbent cotton-wool; 24, rubber glove and batiste bag.



FIGS. 11 AND 12. Samway's staircase box. The divisions of the upper two tins should be removed and a carrier for bottles fitted into one division of the lower tin.

carried—such as needles, needle-holder, scissors, catheter—which are likely to be needed at a normal case, with two sheets of Bilioth tissue, about a foot square, that have been folded, boiled and dried whilst still folded, so that their inner surfaces are clean, and a clean penny towel for drying used instruments. The lower large tin has two compartments. In one are divisions for bottles; in the other, dressings, chloroform mask, gag, &c.

Things that are often damp, such as gloves, douche, apron and small mackintosh sheet, are carried in a separate leather bag, which also serves for soiled instruments, when delivery of the patient is over. A canvas cover fits the Samway's box, which is easy to carry and is not so heavy as a leather bag. The great advantage of this arrangement is that it is orderly, and the instruments needed for an abnormal labour are in a separate compartment which need not be opened at a normal case. The patent staircase hinge of Samway's bandage box is very convenient. The white paint that lines the box should be removed and aluminium paint substituted.^{1]}

We carry the following instruments to all cases:—

1. Barnes' forceps with Neville's axis-tractor.

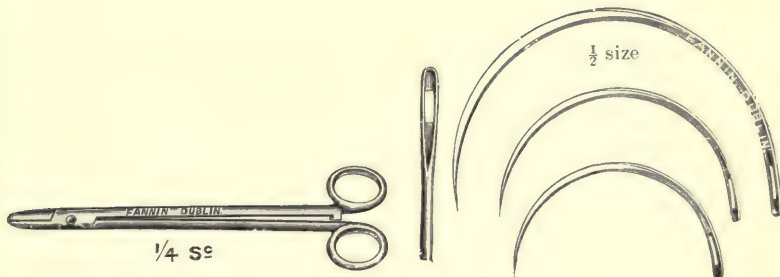


FIG. 13. Needle-holder.

FIG. 14. Large and small curved needles.

2. Martin's needle-holder.
3. Large and small curved needles for perineum and cervix.

¹ These tins can be supplied in Dublin by Messrs. Smith and Sheppard, Stephen's Green; and in London by the Holborn Surgical Instrument Company. The price is 32s.

4. Large and small Bozemann's catheters.
5. Rheinstadter's flushing spoon curette.
6. Bullet forceps.
7. A pair of stout, sharp-pointed scissors.
8. A small pair of scissors.
9. Plugging forceps.
10. Two glass vaginal nozzles.



FIG. 15. Box for sterile needles.

11. Two needles for infusion under the breasts.
12. A metal female catheter.
13. No. 12 or 14 gum elastic male catheter.
14. Mucus catheter, such as Carton's, for mucus in child's throat.
15. Baby's silver catheter.
16. A pocket lancet.
17. A small trocar and cannula.

The first twelve on the list of instruments are carried sterile in calico cases with loops of tape to keep them in position. These calico cases can be bought from any instrument maker. They are boiled, dried in the oven, and their inner surfaces ironed. The twelve instruments (with a second vaginal nozzle and infusion needle) are scrubbed, and boiled in soda solution for five or more minutes. They are picked out with sterile forceps, slipped into the loops, and dry by their own heat. The sides and bottom of the case are folded over and the case rolled up and tied round with a tape.

To avoid having to resterilize all the instruments after each midwifery case, another canvas bag is carried, which holds catheter, perineal needles, needle-holder, and scissors for ordinary labours. The remaining instruments are carried unsterilized. They can, if they are wanted sterile, be boiled in a saucepan at the house. It is well to have



FIG. 16. Instruments arranged in a sterile case. The instruments from left to right are : 1, uterine forceps ; 2, female catheter ; 3, vaginal douche nozzle ; 4, Bozenann's catheter ; 5, plugging forceps ; 6, bullet forceps ; 7, Rhinestadt's flushing spoon curette ; 8, needle-holder ; 9, scissors ; 10, 11, forceps ; 12, posterior speculum ; 13, sharp curette ; 14, uterine sound ; 15, 16, Neville's axis-tractor.

a second set of bags, which are ready and sterilized, whilst the others are in use, for a second midwifery call may come before the first set have been resterilized.

In addition to these instruments, we carry—

1. Rotunda douche. The use of this will be described at the end of this section.

2. Two pairs of rubber gloves.

3. Two threepenny nail-brushes.

4. Infusion apparatus kept apart from infusion needles.

These are carried in separate batiste bags, or envelopes which button down, in which they are boiled before being put into the cowhide bag. After boiling them, hold the bags or envelopes upside-down to let the water run out, and put them all in a large, dry batiste case.

5. Catgut, which can be bought ready sterilized in little bottles with perforated corks, through which it can be drawn and a sufficient length cut off; or silkworm-gut sutures in corrosive sublimate.



FIG. 17. Sterilized catgut in bottle.

6. Chloroform (3 iij), and Skinner's mask, tongue forceps and gag.

7. Opium tabloids in bottle.

8. Sodium chloride soloids for infusion.

9. Biniodide of mercury tabloids in bottle.

10. Squibb's ergot.

11. Creolin.

12. Lysol.

13. Two Dührssen's tins of iodoform gauze, which is very handy for plugging the uterus or vagina.

14. A jar of sterile wadding tightly packed.

15. A hypodermic case with morphine, strychnine, ergotin, digitalin, cocaine, atropine and scopolamine.

16. A small bottle of brandy for hypodermic injections.

17. A small bottle of ether for hypodermic injections.

18. Stout binder-pins.

19. A waterproof apron of light material.

20. A piece of thin waterproof 3 feet by 4 feet, to form a mackintosh on which the patient can lie and in which soiled instruments can be wrapped after use.

21. Soap in a tin. We always carry our own soap. Avoid so-called antiseptic soaps. They do not sterilize the hands and they make the skin rough. The soap is used for lubricating instruments or gloves. Soap is made by boiling, therefore if the outer surface is washed off, it can safely be used for lubrication.

22. Skein of linen thread for ligaturing the cord.

We do not carry perforating instruments (except sharp-pointed scissors), decapitating hook, Hegar's dilators, Champetier de Ribes' bag, or any other special instruments for obstetric operations, as they are very rarely required and can be sent for when needed.

On coming home from a case we always resterilize everything at once, lest an urgent call comes. The instruments are scrubbed with a brush, in soap and water. Bozemann's catheters are taken to pieces, cleared and cleaned. The instruments are then boiled and put into their cases. The waterproof apron and sheet are scrubbed with a brush in soap and water, reboiled, and hung up to dry. The gloves are boiled, dried, and powdered inside and out with baked chalk to prevent them sticking.

In attending a poor patient additional care against dirt is necessary. A clean newspaper on the table is better than a dirty cloth. Carefully cleanse all basins and jugs which may be required by rubbing them with wadding soaked in biniodide of mercury. The kettle makes the safest douche-can. For a diaper, boil a piece of linen or calico and soak it for fifteen minutes in biniodide of mercury (1-2000).

Rotunda douche and how to use it. The Rotunda douche acts on the principle of a siphon. It is made of stout rubber, so that it may be boiled. An ordinary clean jug is used as douche-can. Put the sinker into the jug and hang the curved metal protector over the edge. The curved metal protector prevents the tube kinking. Squeeze the ball chamber and empty it of air. Then allow it to fill with douche fluid from the jug. Turn on the stop-

cock. This starts a continuous siphon action. It is well to try it once at home before using it at a case. Its advantages

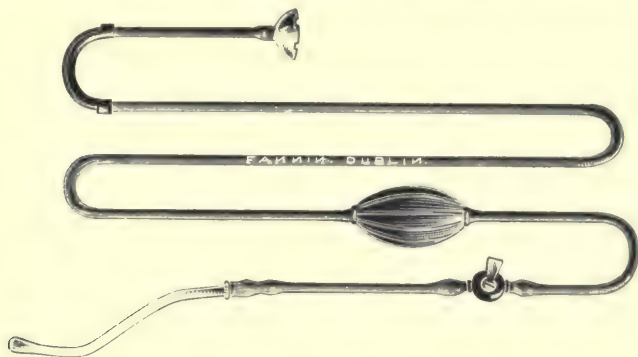


FIG. 18. Rotunda douche with glass nozzle.

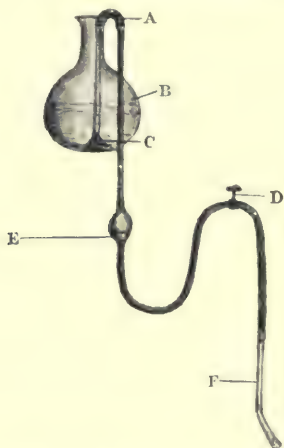


FIG. 19. The Rotunda douche in use. A, curved metal tubing through which the rubber tubing runs; B, jug holding douching fluid; C, weighted plunger attached to tubing and resting on bottom of jug; D, stop-cock; E, pressure bulb for starting the flow; F, glass douche tube.

over a douche-can are its lightness and portability. It costs about 8s. 6d.

CHAPTER IV

THE MANAGEMENT OF A NORMAL CASE OF LABOUR

The necessity for surgical cleanliness. The cardinal rule for good midwifery is to be scrupulously clean.

We measure our success at the Rotunda Hospital by the number of *morbid* cases we get. The number of deaths is not a good test, for deaths often occur as the result of complications and are not due to want of cleanliness. It is not until we compare the death rate in thousands of cases that the superiority of the present-day methods over past methods is seen. That it is not fair to judge of success in midwifery only by the number of cases that die is well shown by the statistics of the Rotunda Hospital during 1766 and 1780. At that time there was no water supply to the hospital, but all the water was fetched from a pump, adjacent to the hospital cesspool. This cesspool leaked to such an extent that it was a cause of complaint by the neighbours and the Master of the time to the public authorities. The patients lay upon beds of straw. Two patients with their babies occupied each bed. Yet, in spite of these conditions, we read in the old reports, that in 1766, with 611 deliveries there were only three deaths, and in 1780 only five deaths out of 919 deliveries. Of course in other years the percentage mortality was far greater than it is now. The morbidity, that is, the rise of temperature, or temperature and pulse above normal, must have been far greater than at present. For instance—in 1878 clinical thermometers were introduced into the Rotunda Hospital. The Assistant Master of that time himself took the temperature of 99 cases during their stay of eight days in the hospital. His notebook shows that no less than 50 per cent. of these

cases showed morbidity, nine had temperatures of 105° F., and eighteen temperatures of 103° F. They were not picked cases, and the Master reports the condition of the hospital at that date to have been 'particularly healthy'.

No one nowadays would look upon these cases as successful merely because they left the hospital without dying. Hence success in midwifery is now reckoned by the percentage of morbid cases.

The British Medical Association, after the meeting at Leicester in 1905, laid down as a definition of morbidity that 'a temperature is to be regarded as morbid which reaches 100° F. on any two occasions between the second and the eighth days. All deaths to be included irrespective of temperature. As some maternity hospitals do not admit abortions, these, for the sake of uniformity, are eliminated from the morbid statistics. The temperature is to be taken in the mouth twice daily as close as possible to the hours of eight a.m. and five p.m.' The temperature of the first twenty-four hours is not taken into account, as during this unstable period the temperature frequently rises, though the cases subsequently are in every way normal.

From 1904-1905, 1,865 women were delivered, exclusive of abortions, in the Rotunda, with a morbidity, on the B.M.A. scale, of 8.77 per cent. From 1905-1906, 1,838 cases were delivered, with a morbidity of 8.43 per cent. From 1906-1907, 1,841 deliveries with 6.41 per cent. morbidity; from 1907-1908, 2,020 deliveries with 5.30 per cent. morbidity; from 1908-1909, 1,973 cases with 3.70 per cent. morbidity; and from 1909-1910, 2,147 deliveries with 4.33 per cent. morbidity. See Appendix. The mortality of these years was 0.31, 0.42, 0.38, 0.35, 0.20, and 0.18 respectively.

The great improvement shown by these figures over the cases recorded in 1878 is almost entirely due to the modern insistence upon surgical cleanliness in conducting midwifery.

What is meant by a normal labour. In some 90 per cent. of midwifery cases the child presents by the vertex, and the child and afterbirth are born within twenty-four hours of the onset of labour, without any help to the uterus and

without complications.¹ Breech and face are considered natural presentations, as with them labour is usually terminated unaided within twenty-four hours.

The nurse. The first business, when a pregnant woman asks her medical attendant to manage her child-birth, is to get a nurse. Probably the patient will choose a nurse recommended to her by some friend. If she does so, we ask to see the nurse and inquire if she makes vaginal examinations. We have already shown the importance of cleanliness in the conduction of labour, and a vaginal examination made when neither the vulva nor the fingers are properly cleansed is fraught with danger. Septic organisms do not and cannot live in the normal vagina. But they do live on the vulva, and they live on unclean fingers. Thus a careless vaginal examination is likely to push dangerous germs into the cervical canal, which is naturally free of them. The danger is comparable to putting a dirty finger into the peritoneum. Therefore, unless sure of the nurse, tell her not to make vaginal examinations. We never permit the nurse to make vaginal examinations. Ask her, if she is a stranger to you, how she is accustomed to wash the patient, to attend to the baby, &c., and tell her how you like things done.

We then give the nurse the following list of things to get:—

2 mackintosh sheets for the bed, a yard and a half by a yard.

12 large wood-wool sanitary towels.

3 ounces of chloroform. It is well to take chloroform as well.

2 large wood-wool sheets.

50 biniodide of mercury soloids.

4 ounces of lysol or cyllin.

Gamgee tissue and absorbent cotton-wool.

4 binders. A binder should be a yard and a quarter long and half a yard wide, made of strong roller-towel material. Women in good position usually prefer the ready-made

¹ For the mechanism of normal labour see Chapter IX.

binders with straps and buckles, obtained from surgical instrument makers.

When the nurse should send in a normal case. If the patient falls into labour in the early hours of the morning, the nurse should try to get her to sleep, giving her a sleeping draught if it has been ordered previously. The nurse should send a written message before breakfast to say that labour has started. The nurse herself should write, describing the nature of the pains, the temperature and pulse, or any other notable fact. This is better than a verbal message from an excited husband. If the patient falls into labour during the day, it is better to go round and make an abdominal examination, and see that she is in labour and that the lie of the child is correct.

How to tell that the patient is in labour. The signs that labour has set in are four: (1) the contractions of the uterus are painful, and the pain is generally in the back; (2) the head in a multipara is fixed between the pains; (3) the 'show'; (4) the dilatation of the internal os.

The pains. The uterus contracts intermittently throughout pregnancy. When labour sets in, the patient becomes aware of these contractions, from the pain they cause her. The transition may be gradual or abrupt. It is usually gradual, and preceded by vague pains in the abdomen.

To detect whether the contractions are painful, if the patient is not in bed, ask her to go to bed. Then palpate the uterus, and note when it hardens (see palpation, p. 45, which should precede all other examinations). Ask her to say when she feels the pains, but do not ask a leading question when the uterus is hard. If the uterus hardens and she tells you she has a pain in her back at the same time, she is almost certainly in labour.

Fixing of the head in a multipara between the pains. This sign is of no use for primigravidae, for in them the head fixes some three weeks before labour. But when the head is found to be fixed between the pains in a multipara, she is in labour. On the other hand, the converse is not true,

for in abnormal cases the head may not fix, although the patient is in labour. By 'fixing of the head' is meant that by Pawlik's grip the head cannot be moved from side to side, or only just a trifle (p. 47). The reason is that the lower uterine segment is firmly contracted round the head, and keeps it steady. The head, by 'engaging' in the brim,

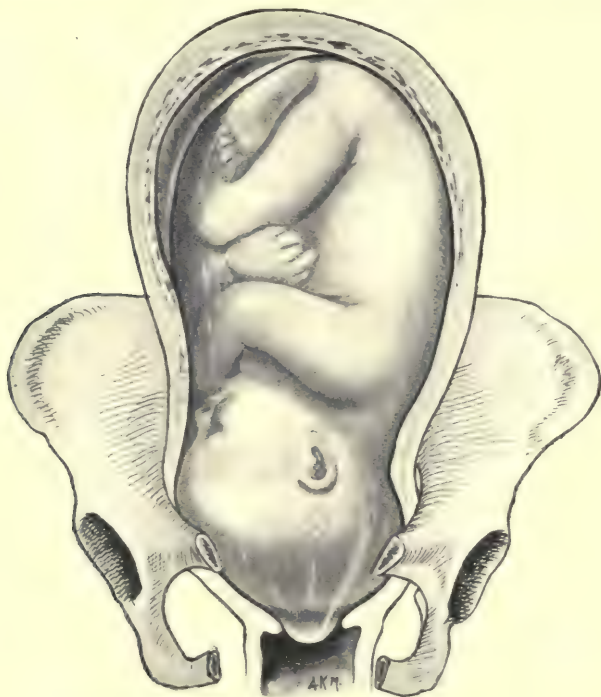


FIG. 20. Diagram to show how the lower part of the lower uterine segment lies below the level of the brim of the pelvis.

reaches the lower part of the lower uterine segment, which lies a little below the level of the brim. If the head can be freely moved, and the contractions are not painful, the patient is not in labour.

The 'show'. Turn the patient on her left side, and look at the vulva. If a blood-stained mucous discharge is hanging about the vulva and vulval hair, it is certain that the

woman is in labour. Its absence, however, does not prove that she is not in labour. The 'show' is not to be confused with the cervical mucous plug, which sometimes comes away two or three days before the onset of labour.

If in spite of careful palpation you are not sure whether the woman is in labour or not, make a vaginal examination to see if *the os is dilated*.

Cleanliness is so essential, to make a vaginal examination safe to the patient, that it is necessary to describe in detail the precautions taken.

Preparations for making a vaginal examination. Three basins are needed, and these are scrubbed inside and out by the nurse before the doctor comes. The jugs must be equally clean. One basin is for soap and water, the second for plain water in which to rinse the hands, and the third for mercuric iodide solution (1-1000). Boil a scrubbing-brush and a pair of rubber gloves in a bag for five minutes in a saucepan on the fire, then upset the gloves and brush from the bag into the basin containing mercuric iodide. Roll up your shirt-sleeves, take the brush out of the mercuric iodide, and scrub your hands with soap and water for four minutes, occasionally changing the water. It is most important that the brush should be boiled, for an unboiled brush is often more dangerous than no brush at all, according to bacteriological research. Pay especial attention to the nails and the spaces between the fingers. Rinse away the soap in the basin of clean water, for soap destroys the action of biniodide of mercury. Soak the hands for one minute in the solution of biniodide of mercury. Lubricate the right hand with soap, and put on a glove which slips on easily when well filled with water.

Lift up the right labium minus with the fingers of the left hand. The muco-cutaneous surfaces of the labia minora, which guard the entrance to the vagina are now exposed. On these surfaces septic organisms are found, therefore they want careful cleansing. Wipe them from before backwards with pledgets of sterile wool which are saturated with thick, soapy water, and then with pledgets

of wool which have been soaking for ten minutes in a small dish (soap-dish) of mercuric biniodide (1-1000),

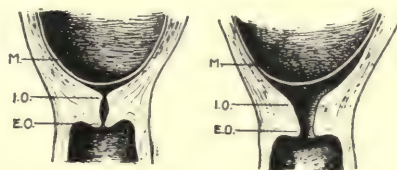


FIG. 21. Diagram to show detachment of membranes when the os begins to open.

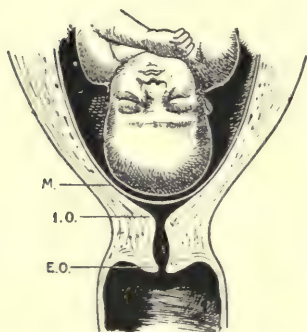


FIG. 22. The closed cervical canal before the commencement of labour. M, membranes; I.O., internal os; E.O., external os.

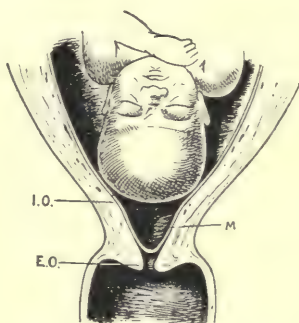


FIG. 23. The cervical canal of a primigravida opening.

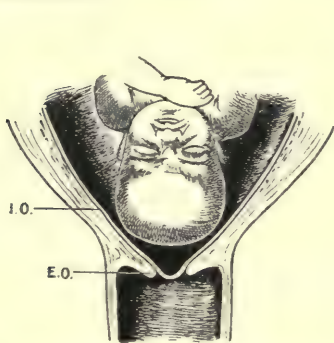


FIG. 24. Further stage of the opening of the cervical canal of a primigravida.

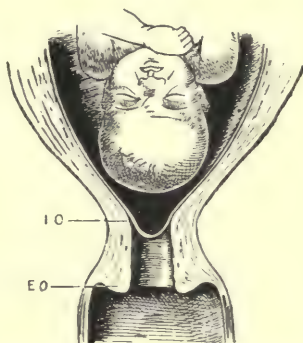


FIG. 25. The cervical canal of a multipara opening.

and lay a piece of biniodide-soaked wool between the labia for a few seconds. The first few biniodide-soaked

pieces of wool wash away the soap; the others act as disinfectants. This soaking and sponging of the labia minora with mercuric iodide is the best disinfection practicable, for the labia cannot be scrubbed. Holding the right labium well up, so that your fingers touch only these cleansed muco-cutaneous surfaces, pass the index, or index and middle finger into the vagina.

What to feel at a normal case. You will feel that the vagina is freely lubricated, and if labour has started the secretion is blood-stained owing to the slight bleeding caused by separation of the membranes that covered the internal os. This is the 'show'. Feel if the rectum is

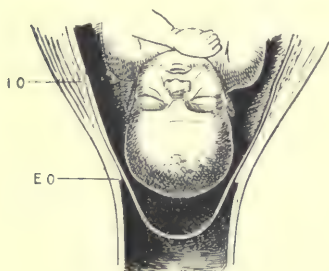


FIG. 26. Cervical canal fully opened.

empty. Then feel for the os. The opened os in a primipara is a circular opening with its edge flattened out on the advancing part. The opened os in a multipara has a short canal in early labour. The illustrations show this. The reason is that the internal os opens before the external in the primipara, but not in a multipara, for the connective

tissue that closed the external os has been torn in the first labour. Indeed, in a multipara frequently a finger can be passed into the cervical canal in the later months of pregnancy, although the internal os is closed. If the internal os is opened in a primipara so as to allow one finger to touch the bag of membranes and the head, and there is no hydramnios, labour has begun. In a multipara, labour has very probably but not necessarily begun. At the same time feel the presenting part. In a normal case it is the head, and it can be felt easily, for the head is engaged in the lower uterine segment. Feeling a suture or fontanelle makes the diagnosis certain. For practice feel a suture on a new-born baby's head. Sometimes the breech feels as hard as the head, but there are no sutures.

Try to make out the lie of the child by vaginal examina-

tion, though it is better to do this by abdominal palpation. The posterior fontanelle, the point where three sutures meet, is the guide to the lie. It is forward

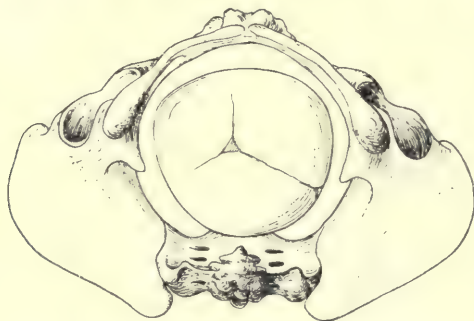


FIG. 27. Vertex II as felt by vaginal examination.

and to the left in vertex I, forward and to the right in vertex II, posterior and to the right in vertex III, posterior and to the left in vertex IV. But this dis-

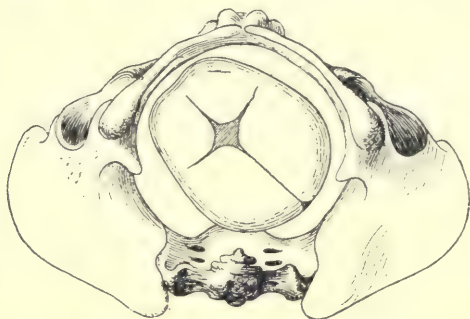


FIG. 28. Vertex IV as felt by vaginal examination.

covery of the lie by vaginal examination is not important, nor is it easy through a small os. Discover if the membranes have ruptured. It is not easy to feel them with gloved fingers, unless there is a pain. The utmost gentleness is necessary to prevent premature rupture of the membranes. When there is a pain the contracting uterus presses on the liquor amnii, and the membranes bulge like a convex watch-glass. Therefore, rub the

uterus up with the left hand to make it contract. Finally, make an estimate as to the size of the os if it is open. If the os is fully dilated, the head down, and the membranes unruptured, scratch through the latter with a boiled catheter's stylet or your finger. A hairpin is always an available and efficient instrument for rupturing the membranes. It should be straightened, placed in the fire until red hot, and then kept in the antiseptic solution until needed. Injuries to the child's head and to the cervix have occurred through



FIG. 29. Vertex II as felt by abdominal palpation.

clumsiness and carelessness in rupturing the membranes. The os is opened fully when its edge cannot be felt at all, anteriorly or posteriorly. It is completely drawn up over the presenting part. You have learnt, then, from the vaginal examination, if the head is presenting, if the membranes are unruptured, if the os is open, and its size, if it is open. Its size gives a clue to the degree of advance of the first stage, for THE FIRST STAGE OF LABOUR IS FROM THE INITIAL OPENING OF THE CLOSED OS TO ITS FULL

DILATATION. When it is fully dilated it retracts above the head and can no longer be felt.

Abdominal examination to discover the lie of the child. In nearly all cases in private we dispense with vaginal examinations, and find out if the patient is in labour, the lie of the child and the progress of labour, by abdominal palpation. With practice, it is quite easy to do this in the great majority of cases. We strongly recommend the



FIG. 30. Vertex III as felt by abdominal palpation.

management of normal labour without vaginal examinations. If you omit the vaginal examination, do not omit cleansing of the external genitalia before the birth of the child.

Place the patient on her back. Then sit on the side by her bed, facing her. Fold some clothes over her chest, for this prevents her watching your hands and takes away her attention from the examination. The bladder should be empty. Lay the palms of your hands on the abdomen and gently dip the fingers into the abdomen, gradually accustoming the abdominal muscles to their play. In abdominal

palpation four methodical grips are described. They are: (1) the fundal; (2) the umbilical; (3) Pawlik's; (4) the pelvic. The word 'grip' is not a good one by which to describe them, for, except Pawlik's, gentle palpation is better than gripping.

1, 2. **Fundal and umbilical palpation.** Sit facing the patient and palpate the fundus between the pains. In a



FIG. 31. Fundal and umbilical palpation.

normal case the breech of the child is at the fundus. It is recognized as the breech, because when it is moved the child's body moves with it, and because there is no groove of the neck that interrupts its continuity with the child's back. The knobs of the feet or knees in the lateral fundal parts may also be felt. They may be felt or seen to move, and the patient may feel a kick at the same time. Foetal movements indicate the position of the breech. Passing down to the level of the umbilicus you will feel the smooth resisting back, if it is turned forward as it usually is. If in doubt about it, fit the palm of one hand over the fundus like a cap and press the breech down. This causes the back to bulge forwards a little, because the body bends and the resistance of the back can be felt by

'dipping' the fingers in passing from one side of the uterus to the other. Or again, press down on one side of the uterus with one flattened hand and displace the child to the other side and make the back more prominent and easier to feel. On the opposite side to the back are the child's limbs, which slip away from the fingers.

Sometimes in normal cases the back is behind and the limbs to the front, in which case the limbs are felt easily, in



FIG. 32. Pawlik's grip.

front and on both sides of the middle line. Your fingers, instead of meeting with the resisting back, dip into the hollow made by the flexed body.

3. **Pawlik's grip.** Pawlik's grip is very useful. It is the same grip as you would use in catching a man by the throat. Sit facing the patient. The thumb on one side and the fingers on the other are sunk down on either side of the presenting part, the head in a normal case. The head is seized in this way, but although the eventual grip is a firm one, the pressure must be gradual or the patient will resist. If, when the head is held in this manner you cannot move it from side to side in the absence of a contraction, it is fixed, and this fixing is a sign of labour in multiparae, but it occurs about three weeks before full term

in primigravidae. Pawlik's grip gives further information. The child's head is flexed, as it passes through the pelvic brim into the pelvic cavity. The result of this flexing is that the prominent forehead is felt higher up abdominally and more readily than the sloping occiput. Flex your own head and feel it, and you will see that this is so. Thus by Pawlik's grip you can tell how much flexed the child's head is, and confirm the diagnosis of the position. Also how much of the head is above the pelvic brim and has not entered the pelvic cavity. If the whole head has



FIG. 83. Pelvic palpation.

entered the pelvic cavity, you only dip into the groove formed by the neck, and might think by Pawlik's grip that there is no presenting part. Then use the fourth, or pelvic, grip.

4. **Pelvic Palpation.** This time sit or stand with your back to the patient's face. The two hands with fingers extended are pressed gently down on either side of the pelvic cavity. The head can be felt in this way until it is almost down on the perineum. The child's forehead fills up its own side of the pelvic cavity more than the occiput, and so you get confirmation of the position. You can also

observe the advance of the child, by noting how much of the head has sunk in the pelvic cavity between two examinations.

Listening for the foetal heart. Lastly, listen for the foetal heart, either with a phonendoscope or by applying your ear directly to the patient's abdomen. It is best heard on the side to which the back is turned, below the level of the umbilicus. It beats between 120 and 160 to the minute, except during a pain, when it may slow down to 80 per minute. This marked alteration occurs only after the membranes are ruptured.

Information now gained. You are now in possession of some very useful information with regard to the patient. You know whether she is at full term and whether she is in labour. You know that the child is lying normally and is alive. You can make a fair guess at the stage of labour by the amount of flexion of the head and how far it has sunk into the pelvic cavity. If the patient has had pains, notice by Pawlik's or the fourth grip whether the head has advanced. If a vaginal examination has been made you know the size of the os and whether the membranes are intact. By asking the nurse, if there has been no vaginal examination made, you can find out if the membranes have ruptured. Also find out how frequent and strong the pains are, whether the bladder and bowel are empty, and ask the patient as to whether she was quick or slow with previous labours, if she is a multipara. Remember, a full bladder or full rectum are the only obstructions to a normal labour.

When it is safe and when it is unsafe to leave the patient. One of the trials of the obstetrician is the difficulty of predicting the probable progress of labour. Mistakes are certain to occur in every practice. The baby is born soon after he leaves and he gets the blame. At the same time, he cannot wait with a patient, who may be two or three days in labour.

The chief points on which to decide are the character of previous labours, the nature of the pains (remember a doctor's entrance often frightens them away), their force

and frequency, the position of the head in the pelvis and whether the membranes have ruptured. If the head is sunk in the pelvic cavity, as told by Pawlik's and the pelvic grip, it is not safe to leave. If the membranes have ruptured, do not leave. If, after waiting some time, you are in doubt as to progress, it is better to make a vaginal examination to find out the size of the os and discover whether the patient is in the second stage or not. The average duration of the first stage of labour, that is, from the beginning of the opening of the internal os by painful contractions to its full dilatation, is in primigravidae about fifteen to eighteen hours, but it may range from under six hours to over twenty-four. In multiparae it averages about ten hours. Consequently, if in a multipara labour has started with good pains, it is better to stay, or at any rate not go far away. With a primigravida, on the other hand, there is not the same necessity. Never leave a patient in the second stage, that is, after full dilatation of the os; but if the os is not fully dilated in a primipara it is usually safe to leave.

When the nurse should send for the doctor.

1. If the membranes rupture.
2. When the second stage pains begin. The pains of the second stage are characterized by the patient's bearing down with them. She gets red in the face from this, she sweats, and her pulse quickens during the pains. They last longer, come more frequently, and are more painful than those of the first stage. A practised nurse can nearly always tell them from the shorter, less violent, and less frequent pains of the first stage.
3. If any signs of 'pressure' appear, that is, if the perineum begins to bulge at all with the pains, or if faeces are pressed out of the anus with the pains.

If you stay, wait downstairs until the second stage has begun, else the patient may begin worrying for chloroform. Chloroform is bad for a patient in the first stage, for it tends to lessen the pains.

Enemas. Preparation of the bed. Whilst you are away, or waiting downstairs, the nurse, who has given her patient a purge at the beginning of labour, gives her an enema, if

the purge has not acted. It is necessary to have the rectum empty to avoid the risk of the colon bacillus getting into the vulva and vagina from faeces expressed as the head is born. Many cases of sepsis are due to this organism.

The patient should walk about in the first stage, if possible. If the nurse has not already arranged the bed, she does so now. We are accustomed to arrange it in the following order from below upwards:—

1. A hard mattress.
2. Blanket.
3. Sheet.
4. Mackintosh.
5. Draw-sheet.

These are all tucked in under the mattress.

6. The binder laid out.
7. A second mackintosh overhanging the edge of the bed, so as to protect the underlying clothes.
8. Draw-sheet or wood-wool sheet, which must be loose and not fastened by safety-pins.

The patient is confined on the draw-sheet or wood-wool sheet. After delivery, she is washed and turned on her back. The draw-sheet and upper mackintosh are then withdrawn and the patient lies on the binder and draw-sheet. A narrow bed, to which there is access on both sides, is much more convenient than a large bed. A large tin bath is put under the bed to catch any blood and liquor amnii, and save the carpet from getting soiled. A piece of oilcloth may also be used for this purpose. The amount of bedclothes necessary is arranged according to the temperature of the room. The nurse pins the edge of the sheet to the quilt with binder-pins. They can then be all lifted off at one time and the woman quickly exposed, if need arises.

Preparation of the room. The nurse empties the basins, except that containing the mercuric iodide solution. She sees that there is plenty of hot water and a kettle on the fire. She gets a small table, or something on which a chair can stand, so that if a douche is needed in an emergency the stand for it is ready. A small basin is needed for the

afterbirth. The instruments can be put in the basin with the plain water.

The second stage. See that the room is arranged as you wish, that the douche is ready except for the addition of the hot water from the kettle in case there is haemorrhage. This is a precaution always worth taking. We carry the Rotunda douche with vaginal nozzle ready boiled, so that we only have to take it out of the bag, if it is needed.

Have two pairs of boiled rubber gloves in the basin with biniodide of mercury solution and the ligature for the child's cord. In the basin with plain water place a nail-brush, a clip forceps to clip the cord at once, if the child is in white asphyxia, and a pair of scissors for cutting the cord; also strips of clean linen, or better small pledges of moist cotton-wool, for the child's mouth and eyes. Get out the chloroform mask, if the patient asks for chloroform, and take note of any other instruments that may be required. See that the hypodermic syringe is in working order

You now know where everything is, so that if an emergency arises you will be able to set to work coolly and deliberately, without confusion. But it is well to set about these preparations quietly, for a clatter of instruments is apt to frighten patients.

The position for the second stage. The left lateral position is the common one. It leads to less exposure and is warmer than the position on the back. It is easier to attend a woman single-handed when she lies in the left lateral position. It is also necessary to see that the nightdress is tucked up well away from the buttocks. If this precaution is not taken the nightdress will certainly be soiled, and changing it will unnecessarily disturb the patient. If the second stage is tedious, she may lie on her back, for, as Smellie says, 'in this position the weight of the waters, and, after the membranes are broke, that of the child's head will gravitate downwards, and assist in opening the parts, while the contracting force of the abdominal muscles and uterus is more free, strong, and equal in this than in any other attitude.'

How to make the patient bear down effectively. If the

patient does not want chloroform, the child will be born much more quickly if she bears down properly during the second stage. To make her bear down, put her on her left side. Tie a roller towel to the end of the bed. Put a foot cushion or stool against the end of the bed, against which she can put her feet when she has a pain and down the side of which she can put her legs when she has no pain, and thus avoid cramp. When she has a pain, she flexes her legs



FIG. 34. Diagram of the head on the perineum.

and puts her feet against the cushion. She pulls on the roller towel and keeps her mouth closed. Press your thigh into her back by putting one knee on the bed. She thus gets far better power to bear down than if she is left to herself. You may also assist by pressing on the fundus during a pain after the membranes have ruptured, but sometimes this is too painful. Sometimes, however, pressure on the fundus will save the necessity of forceps.

When to give chloroform. If the patient asks for chloroform, she should have it when pressure signs arise. The perineum bulges with each pain, which shows that the head is well down, and the labia open a little. The anus is protruded. The head may be felt between the pains by pressing the fingers up between the anus and the coccyx.

How to give chloroform. We use a Skinner's mask. The patient holds it over her face and we drop chloroform on it at the beginning of each pain. The patient lets it fall from her hands when she is sufficiently bemused. Or we keep her chattering and rambling until the head is just going to be born, when more chloroform is given to prevent her kicking. Never press the chloroform, for it has been shown that the drug passes from the mother's circulation through the placenta into the child's blood.

How to watch the progress of the head. Watch it by palpating the head by the pelvic grip. If the head is too far down to be reached by this grip it can be reached by pressing the fingers up between the coccyx and anus. The formation of a caput causes perineal pressure and simulates descent of the head.

Is it necessary to make a vaginal examination, when the waters break? If the head was fixed before rupture there is no need. If it was not fixed, do so to determine if the cord has prolapsed.

Is it necessary to rupture the membranes? If the head is in the pelvic cavity and the os fully or nearly fully dilated, you may rupture the membranes if it is desirable to hasten delivery. Take a boiled catheter stylet and scratch through the membranes. But it is not necessary to make a vaginal examination especially to do this. If the membranes appear at the vulva they should always be ruptured, for otherwise the child may be born with a caul and suffocated. If the child is born in a caul it should be removed at once.

At times the anterior lip of the cervix is stretched and thinned out over the presenting head, although the latter is near the vulva. So thin is it that errors are constantly being made, and this condition mistaken for full dilatation

of the os. With care the os always can be felt high up, posteriorly in the vagina.

Importance of attempting to save the perineum and recognizing even small tears. Next to sepsis, an un-mended or undiscovered tear of the perineum is the only harm that can happen to a woman who has a normal child-birth.

The child's head is driven down by the abdominal muscles and the uterus. It is directed forward through the vulval orifice by the levatores ani. The levator ani is a muscle which pushes the pelvic organs upwards and

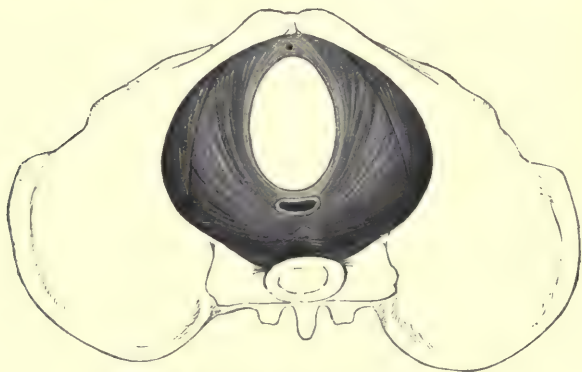


FIG. 35. The pelvic floor from above.

forwards. It runs obliquely across the pelvis and slings up the pelvic organs with the help of the pelvic fascia. If the levator ani and pelvic fascia are ruptured, this sling to, or floor for, the pelvic organs is weakened, and, owing to the upright position of the female, descent and prolapse of her pelvic organs is very likely to gradually follow. It is a curious fact that vaginal and uterine prolapse are more frequently seen in conjunction with the shorter tears ($\frac{1}{2}$ –1 in.) than in those where central perineal slit involves the rectum, the reason being that the levator muscles are divided at their tendinous insertions in a central tear while the muscle fibres themselves escape laceration (see also p. 356). Gynaecologists and obstetricians are nowadays agreed upon the necessity of suturing every tear of the

perineum, other than laceration of the mucous membrane of the fourchette.

It is seen that to some extent the uterus and levatores ani antagonize each other. The uterus pushes the head downward; the levators, upward and forward. The action of the levators can readily be seen in the receding of the head from the vulva, when the uterine contraction has passed off. The uterus clearly has the better of the contest, for the levators are weakened by being stretched over the advancing head. Consequently, if the uterus is strong, the head large, or the parts unrelaxed as in a primipara, a rupture of the levator ani is very likely to occur. The perineum practically always tears with the levator ani, but it may be badly lacerated, although the perineum is only slightly torn. The importance of recognizing this tear is great from the patient's point of view. A neglected tear may lead to cystocele, rectocele, retroversion, prolapse, and all their attendant evils.

A method of 'saving' the perineum. As has been said, obstetricians are agreed on the desirability of saving the perineum, but they are not agreed as to a method of doing so. In fact, one has a right to be sceptical about 'saving' the perineum.

Our method at the Rotunda Hospital is based on the following principle. The flexed head is pushed by the uterus down to the perineum. Between the pains the levatores ani push the foetal occiput up against the pubes. When the occiput is under the pubic arch, the levators push the head forward and it is delivered by extension. We try to assist the action of pushing the head forwards against the pubes, at the same time maintaining flexion until the occiput has passed the symphysis.

To follow the Rotunda method, stand facing the patient's feet. Pass your left hand between the thighs from in front. The right is held free. Both hands are gloved. The thighs must not be widely separated, for this stretches the perineum. Place the fingers of the left hand on the foetal head and press it against the pubes, at the same time preserving its flexion until the occiput has passed the

symphysis. When what would be the last pain but one is passing off press with the right hand midway between the anus and coccyx; this causes extension, and the head is quietly expressed.

The anterior portion of the perineum which is so tensely drawn out immediately before the birth of the head is comparatively an unimportant structure, consisting for the most part of skin and subcutaneous fat. Its giving way is



FIG. 36. Saving the perineum.

significant because tearing of the levator always precedes it, and we are thus furnished with an early sign of injury to this muscle. A still earlier sign is slight haemorrhage appearing before the head has distended the perineum to any extent.

We do not recommend either direct pressure on the perineum or episiotomy. Direct pressure seems apt to determine the tear and excites more powerful uterine action. By episiotomy is meant cutting the perineum with scissors and so anticipating a tear. You cannot be sure whether the perineum is going to tear or not, and if

it does tear, when stitched, it will heal as well as a cut with the scissors. In very rare cases the tear of the perineum begins in the neighbourhood of the anus, and is apt to extend backwards and forwards. If this occurs episiotomy would save laceration into the rectum.

So much for our method, yet in spite of its adoption in the hospital 45 per cent. of our primiparae get torn perineums to a greater or less extent, and have to be stitched. Most of these cases are, however, attended by students and probationers without much experience.



FIG. 37. Pulling down a loop of cord that is round the baby's neck.

When the head is born. First see if the cord is round the child's neck. Do not push two fingers into the vagina, but pull the child's head towards the coccyx, which makes touching the vulva unnecessary. If the cord is round the neck it will be visible. Pull down a loop of it and pass it over the head. If the shoulders are being born, it can be slipped over the shoulders. If it is too tight to do this cut the cord with scissors and deliver the child quickly, a proceeding that is rarely necessary. A cord so tightly pressed upon will not bleed whilst the child is being delivered.

Care of mouth and eyes. There may be much mucus in

the mouth of a child. Its first breath is inspiratory, and it may choke itself with mucus. Therefore wipe out the child's mouth with a piece of soft linen, or pledgets of damp cotton-wool, when the head is born. With similar pledgets of cotton-wool carefully wipe the eyes from the outer canthus inwards.

Birth of the shoulders. The birth of the shoulders is brought about naturally by the pain that succeeds the one that pushed out the child's head. It is quite safe to wait for this pain, unless the child's head gets very blue or the face has convulsive twitchings. The placental circulation has not stopped, and the child also often takes short breaths. If the child's head gets very blue, rub up the uterus to a contraction and deliver the shoulders by pressure on the fundus. Should this be unsuccessful, pass a finger into the vagina, hook it under the anterior armpit and pull the shoulder down under the pubic arch. Do not deliver both shoulders together, for they may cause or enlarge a tear of the perineum.

It is unwise to pull on the head to deliver the shoulders, unless you are absolutely sure of the position, or watch very carefully how the child's head is going to twist. The reason of this will be explained under the mechanism of impacted shoulders, which does not belong to normal labour.

Delivery of the body and legs. This is brought about by the same contraction that delivers the shoulders. Whilst the shoulders are being born, catch the child's head with your hands and guide it up towards the abdomen of the mother.

When the child is born, examine the perineum, turn the mother on her back and let the child lie between her flexed thighs. In private practice we wait for a few minutes for the blood and liquor amnii to drain away, and thus avoid soiling the bed. The third stage of labour, namely the delivery of the afterbirth, has now begun.

The third stage. Turn the woman on her back near the edge of the bed, so that only the side of the bed gets soiled. It is easy to turn her by passing your arm under

her bent knees. Be careful, when she is being turned, that she does not kick the baby. She is especially apt to do this if she is dazed with chloroform.

Advantages of the position on the back. It is the most convenient position for the obstetrician, for he can control the uterus better when the patient is lying on her back.

It prevents air being aspirated into the uterus. The heavy uterus falls over to the left side after delivery of the child and air rushes in. Air embolus might result, or saprophytes might get aspirated into the uterus. There is no real proof that either happens, but at any rate they are avoided by the position on the back.

The mother has lost considerable heat during delivery, and if she is not covered she will shiver. This rigor, though disagreeable, is of no significance. The room must be warm and she must be covered by a blanket. The clothes should cover her chest, abdomen, and lower limbs. If she bends up her knees, she will save the clothes from being soiled.

See, again, that everything is ready in case of a sudden rush of blood. Run through in your mind the way in which you would set to work, should post-partum haemorrhage occur. For example, the douche-can or jug is resting on a chair, and there is space on a table near the patient on which the chair can stand. The hypodermic syringe, with a small bottle of brandy or ether, is on the mantelpiece. Rubber gloves are in the basin. The sterile case containing a catheter, a vaginal nozzle, and a Bozemann's catheter and perineal needles and needle-holder, and the bag with the Rotunda douche, if this is used, are near at hand. There is cold water in the jug and a kettle with boiling water on the hob. Thus everything is ready, and if bleeding occurs you can set to work deliberately, without unnecessarily alarming the patient.

Attention to the child. As long as the cord pulsates well the child is getting oxygen. It may be blue. If so, hold it up by the legs and slap its back. The first breath is inspiratory. Holding the child up by its legs makes the

mucus run out of the throat. It is well to again wipe its mouth out with soft linen, before making it breathe. Suck the mucus out by a catheter. At the Rotunda we use a catheter devised by Dr. Carton (late Assistant Master), which, by means of a reservoir, prevents the attendant sucking mucus into his own mouth. A few slaps or a little cold water will make the child cry.

When to tie and cut the cord. Experiments have shown that if the cord is cut as soon as the baby is born, the baby is deprived of about three ounces of blood, which remain in

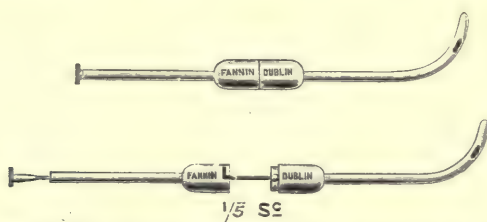


FIG. 38. Carton's catheter, closed for use and opened for cleaning.

the placenta, instead of being sucked along the umbilical vein. It is also observed that babies who have their cords cut at once do not thrive so well as those that have their cords cut when pulsation has ceased, owing to the loss the former sustain. Therefore do not cut the cord until all pulsation has ceased.

Take the ligatures from the biniodide of mercury solution and tie the cord in two places with reef knots; wet ligatures are firmer. Cut with sterile scissors between the ligatures. A ligature at the placental end of the cord is not essential, but saves mess and becomes essential if there is a second child in the uterus. In the latter case the anastomosis between the placentae may be so intimate that the second child will bleed to death if the cord is not tied on the maternal side. The second ligature should be tied on a gently stretched cord about three inches from the vulva. The cord is stretched to pull loops out of the vagina. Give the child to the nurse when the cord is cut, and see that the cut end does not bleed.

Control of the uterus. Although control of the uterus is not necessary in a normal case, the teaching of the Rotunda Hospital is to keep a light control of the uterus between the birth of the child and the afterbirth, and for some time after the delivery of the afterbirth. To do this, sink the ulnar surface of the hand into the abdomen above the fundus of the uterus. Do not massage or rub the uterus at all, but lightly keep contact with the fundus. Normally, the uterus contracts and relaxes, but you can feel it the whole time. Sometimes, however, when the uterus is very flabby and fills with blood, it rises somewhat and its outline becomes indistinct. At the same time the patient's pulse may quicken, or she may get a little pale. It is chiefly to detect such an occurrence that we recommend this control of the uterus. This mishap is not common, but when it does occur, it is highly important to be immediately aware of the condition, and this your hand will determine. We think that control also has the effect of diminishing the amount of retroplacental haemorrhage.

Delivery of the afterbirth. The uterus expresses the afterbirth into the vagina. Owing to the patient lying down, the afterbirth will stay in the vagina a long time. So when the uterus has squeezed the placenta into the vagina, express it from the vagina. It is necessary therefore to know when the placenta has left the uterus and is in the vagina.

How to ascertain when the placenta is in the vagina.

1. The cord lengthens. A ligature was put on the lightly stretched cord some three inches from the vulva. When the placenta has left the uterus, the part outside the vulva lengthens some inches. This is a most reliable sign. In the event of the placenta being expelled into the vagina before the ligature is tied, this sign of course will not be present.

2. The second sign, however, will be present. Draw the extra-vulval cord out straight. Lay the hands on the abdomen and lift the uterus up towards the ensiform cartilage. If the placenta is in the uterus, it too will be lifted up and the extra-vulval cord will be drawn a corresponding

amount into the vagina. If the placenta has left the uterus, the cord is not drawn into the vagina. Again, press down the fundus of the uterus gently. The lightly stretched extra-vulval cord advances. Release the uterus, which springs back. If the placenta is in the uterus it springs back too, and the extra-vulval cord is drawn up into the vagina. If the placenta is not in the uterus it does not spring back, and the lengthening of the extra-vulval cord remains.

3. When the placenta lies in the upper part of the vagina the uterus is perched up on it. The uterus, therefore, rises,

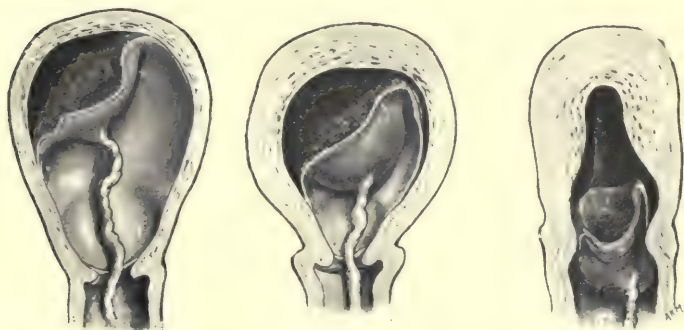


FIG. 39. Diagrams of the expression of the placenta into the vagina and signs resulting therefrom.

and the fundus rises sometimes above the umbilicus. Mark the height of the fundus immediately after the child is born, to detect this sign. It is not always possible to detect this rising of the uterus.

4. For the same reason, the uterus, perched on the placenta in the vagina, can be readily ballotted. This is not a very reliable sign, for sometimes the uterus can be ballotted freely, although it still contains the placenta; possibly when the placenta is in the lower uterine segment.

5. The placenta in the vagina sometimes bulges the hypogastrum like a full bladder, and this bulging can be seen.

Attention to these signs, especially 1 and 2, will show when the placenta has left the uterus.

Theories as to the separation of the placenta from its uterine attachment. Commonly three to four pains suffice to separate the placenta from the uterus and expel it into the vagina.

Schultze explains the separation in the following way. Haemorrhage from the uterine sinuses takes place behind the placenta, and a retro-placental haematoma forms and separates the centre of the placenta from the uterus. A contraction occurs and flattens out this haematoma under the placenta, and causes further separation. With the next relaxation more blood is poured out, and so the centre of the placenta gets pushed down towards the cervix. Finally, the centre of the foetal surface of the placenta appears first, and in the hollowed cup of the maternal surface is the haematoma. We find that in the large majority of cases the centre of the foetal surface of the placenta appears first at the vulva, and in the cup of the maternal surface there is a large haematoma, and we, therefore, think Schultze is right in the majority of cases.

Sometimes, however, the lower edge of the placenta appears first at the vulva, and the placenta, folded longitudinally, is delivered. The explanation of this delivery is that the placenta separates at the edge first, just as it does in placenta praevia, for the lower edge of the placenta is less supported than the rest of the placenta. We have frequently noticed the placenta coming away in this manner in cases where it has been by force directly expressed from the uterus, and we think it is more likely to be followed by retained membranes. This mechanism is nearly always preceded by haemorrhage and expulsion of clots.

How long does the uterus take to express the placenta? The uterus may expel the placenta at once after the birth of the child, in five, ten, thirty or more minutes. If it has not done so within an hour the case is, from a practical point of view, abnormal.

How to express the afterbirth from the vagina. Ascertain by the signs given that the placenta has left the uterus. It is well to wait for a few minutes after the placenta has

left the uterus, for delay may facilitate separation of the membranes.

Either wait for a contraction or rub up the uterus to a contraction. Use the contracted uterus to push the placenta out of the vagina. To do this, grasp the fundus with the hand and press it back towards the spine, and down towards the vulva, pushing in the direction of the pelvic



FIG. 40. Expressing the placenta.

axis. Normally the force required is not great, and the gradual rolling of the afterbirth out from the vulva gives the clue to the minimum force that is needed.

Pulling on the cord as well is quite justifiable, if the entire afterbirth has left the uterus. If, on the other hand, any bit of the afterbirth is still adherent, it might get broken off and be left behind. It is a mistake that might occasionally occur, so it is better to deliver the afterbirth without pulling on the cord. Inversion of the uterus also has resulted from pulling on the cord. A clean small basin

pressed up against the buttocks can be used as a receiver for the afterbirth. Using a clean basin in this way lessens soiling of the bedclothes. Clots that form on the draw-sheet should be removed with a sterilized shallow basin and not with the hands.

If attempts at expression fail to deliver the afterbirth, either the direction of the force is wrong or the placenta has not left the uterus.

To sum up the delivery of the placenta, control the uterus with the hand until the placenta has left, and then express it by pressing the contracted uterus backwards and downwards.

Delivery of the membranes. The method frequently advocated is to twist the placenta round and round until the membranes come away. This is utterly unlike the natural delivery of the membranes, when left to the uterine muscles. The membranes will sometimes be torn instead of being pulled off the inside of the uterus if the placenta is twisted.

We teach nurses and students to pull the placenta out gently with light traction, making two or three turns of the placenta, using both hands. Often this is sufficient to make the membranes slip out of the vagina. If not, take them in their breadth gently with as many fingers as possible, so as to spread the pressure of the fingers evenly. Then pull gently with a slight rocking movement up and down, and from side to side. Gradually they will answer to the traction and come away. Sometimes they tear under the fingers, and the sensation of their giving way is readily recognized. When you feel that they are giving way, take hold of them nearer to the vulva, and again pull gently, putting traction on the part that is not tearing.

Result of membranes being left in the vagina. The membranes, if left in the vagina, rot in two or three days. A mild sapraemia results. Therefore, if membranes are left in the vagina, it is better to remove them.

How to remove torn membranes from the vagina. Catch the near end of the membranes with the thumb and base of the index finger, which should be inserted into the vagina,

and twist the index finger round and round them. With gloves this is difficult, and therefore a forceps may be used to fix the membranes. Pull gently, and they will come away.

What is to be done if membranes are left in the uterus. They may give rise to post-partum haemorrhage, but this is unusual. There is greater risk of sepsis in attempting to remove membranes from the uterus than from the vagina. We, therefore, wait in the house with the patient for two hours. If during that time there has been no disquieting haemorrhage, we give the patient a drachm of Squibb's ergot, and allow the membranes to come away in the lochia, which they usually do without trouble in a few days. If a large amount of membrane is left it will almost certainly cause subsequent temperature, therefore it is probably better practice to remove it immediately.

The placenta at full term weighs about one pound, and is more or less circular, with a diameter of seven inches. It has two surfaces, maternal and foetal. The maternal surface is divided up by clefts into from fourteen to twenty lobes or cotyledons. The foetal surface is covered with amnion, which runs up to and fuses with the root of the umbilical cord. In order to demonstrate this fusion the amnion can be peeled off the foetal surface up to the insertion of the cord. The outer foetal membrane, the chorion, fuses with the edge of the placenta. Its inner surface is closely applied to the amnion, from which it can, however, be separated with care. The maternal surface of the chorion shows yellow granular remnants of the decidua vera, with which it was in contact during pregnancy.

The umbilical cord is a twisted cord averaging about eighteen inches in length. It joins the placenta either centrally or eccentrically. At the root may be found a small vesicle, the umbilical vesicle, or remains of the yolk sac. When the cord is cut across, the mouths of the umbilical vein and two umbilical arteries can be seen embedded in Wharton's jelly. At other times the cord breaks up into a leash of vessels before reaching the placenta (*velamentous insertion*). If these vessels pass over the internal os they

may tear with rupture of the membranes and cause foetal death from haemorrhage.

Examination of the afterbirth. To examine the afterbirth first turn the maternal surface upwards, holding the placenta in the two hands. Normally, the lobes of the placenta, when it is complete, fit accurately together. Should there be a tear, the sides of the tear fit accurately when brought gently together by pressing the periphery of the placenta towards the centre. If there is a piece of placenta missing this accurate apposition will not occur. There will be a gap or space not filled by placental tissue. Then

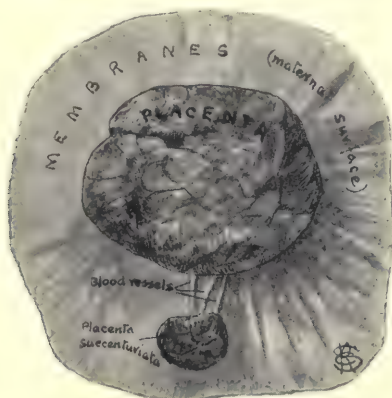


FIG. 41. Afterbirth with placenta succenturiata.

examine the edge of the placenta. Occasionally there is a small additional placenta, or more than one, the so-called *placenta succenturiata*. This is fed from the main placenta, either by a thin bridge of placental tissue bearing vessels or by vessels only. If it is left in the uterus the vessels that feed the placenta succenturiata will be found broken off at the edge of the main placenta. It is important to recognize the existence of a placenta succenturiata, for it must not be left in the uterus, but has to be removed like an adherent placenta. We urge care in this respect, for the presence of a placenta succenturiata is often missed, and when left behind in the uterus leads to severe haemorrhage or sepsis.

Having examined the maternal surface of the placenta,

turn the maternal surface downwards and examine the membranes. If a placenta succenturiata has been left in the uterus, there will be a hole in the amnion and in the chorion corresponding to it. See that the membranes, when spread out, appear to be large enough to enclose the foetus and liquor amnii, and see if any bit is missing.

Sometimes the membranes are so ragged that it is impossible to tell if any part of them is missing.

Abnormalities of the afterbirth. The placenta may present many other abnormalities, besides that just described. It may consist of two or three joined divisions, the *bipartite* and the *tripartite placenta*, or be composed of a greater number of portions united by the membranes. In cases where the mother has renal disease it is often large and sodden. A spread-out, thin placenta is known as *placenta membranacea* (p. 136), and a condition in which the periphery of the placenta forms a sort of raised wall to the central portion earns the name of *placenta circumvallata*. The cord is sometimes inserted at the very edge of the placenta, the *battledore placenta*.

On the whole, the recognition of these forms is only of importance in a negative sense, for they are without effect upon the mother, except only when a piece of an abnormal placenta is overlooked and left in the uterus.

White infarcts of varying number and size are not infrequently found in the placenta, and may form a white rim to part of the placental periphery (*placenta marginata*). They are not of any clinical importance unless they interfere with the functions of the placenta by involving large portions of it.

Pink or red infarcts are also found, though more rarely. They have been observed in mothers who have albuminuria, and in cases where the child was still-born.

Small calcareous nodules are not uncommon, and possess no practical importance.

Placental cysts are sometimes found.

The placenta correlated with foetal syphilis is described on p. 181.

The cord itself is sometimes looped around some portion

of the child, or has true knots tied in it by the child slipping through a loop, or is abnormally twisted.

Very rarely is the foetal circulation interfered with by any of these abnormalities.

The perineum. The necessity of carefully inspecting the perineum and the wrong done in leaving a laceration unstitched have already been urged. There are two conditions commonly seen: in one a simple central split of the perineum with firm yellow-red tissue on each side of the tear; in the other a tongue of vaginal mucous membrane hangs down, as if stripped off the posterior vaginal wall, with bruised and ragged blue-red torn tissues. The cause of this laceration is as follows. The central raphe of the levator ani is strong. The tearing force takes the line of the least resistance and rips through the bruised and stretched muscular fibres of the levator ani on one or both sides. This lateral tear undermines the mucous membrane of the posterior vaginal wall, which consequently hangs down as a tongue. The tear then starts in the perineum centrally and runs up laterally into the vagina. The support of the pelvic floor to the pelvic organs is impaired much more by this lateral tear of the levator ani than by a simple central tear of the perineum. Prolapse of the vaginal walls with retroversion and even prolapse of the uterus follow eventually. More immediately there is some risk of a puerperal ulcer, unless the perineum is united.

How to examine the perineum. The patient lies on her left side, with her buttocks over the edge of the bed. A good light is essential. Having cleansed your hands, separate the labia. Sponge the parts free of blood with pledgets of cotton-wool soaked in mild antiseptic. By holding the labia well open and sponging them, you will be able to see well. If there is a lateral tear running up into the vagina, pass a gloved finger up along it to discover its extent and depth. It is a good thing to do this immediately after the child is born, for the parts are least sensitive then, and in addition the patient is only partly conscious if she has had chloroform.

How to sew an ordinary perineal tear. Sewing a perineum is least painful immediately after birth. Therefore, if the patient has had chloroform, insert the stitches while she is still semiconscious. Either tie them at the time, or tie one knot and then tie the second turn of the reef-knot after the placenta has come away. In the case of a primipara, have sutures, needle-holder and needles ready in the basin before the birth of the child: they are so likely to be needed. We use silkworm-gut, and occasionally catgut. Catgut is sterilized by boiling for half an hour in alcohol in Jellett's catgut sterilizer. Catgut sutures dissolve, so need not be taken out, and the patient is un-

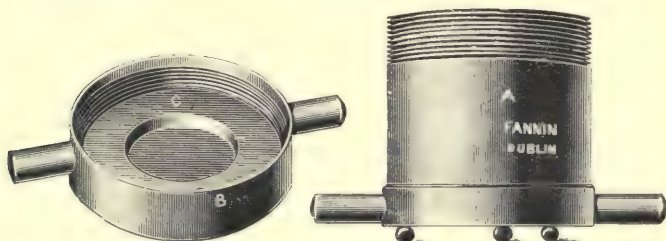


FIG. 42. Jellett's catgut sterilizer. A, strong metal box with screw top, handles, and feet to prevent bumping when boiling; B, lid with handles; C, thick rubber washer.

aware that she has been stitched. But silkworm-gut is more reliable.

The patient is in the same position as for inspection of the perineum. Use a long needle-holder provided with a $2\frac{1}{2}$ in. fully curved needle. This needle will of itself, if passed deeply, take in thick masses on either side and so include the torn portions of the levator ani. Hold the wound open with the middle finger and thumb of the left hand, and insert the index finger into the deepest part of the wound, that it may feel the needle as it passes across deep to the bottom of the wound. Starting at the skin edge, plunge the needle down the under-side of the tear, pass it deep to the laceration and bring it along the upper-side of the tear out to the skin. Remember always to keep deep to the deepest part of the wound and parallel to the course

of the rectum. Insert the stitch that is nearest the anus first, for this will be the most important. When the inserted needle is lifted the entire torn surface should be lifted up on it, in this way showing if the deepest parts have been included. Do not tie until all the stitches are inserted, and then tie them with reef-knots. If the parts are very ragged and oedematous, do not tie too tight, for the stitches may cut their way out. Unless the torn tissues are very



FIG. 43. Sewing a ruptured perineum.

damaged or have become infected, they unite by first intention. The vulval pad is sufficient dressing.

Can a perineum be sewn up later than the day of delivery? Clean granulating surfaces unite readily when brought together by stitches. Therefore, as long as there are raw surfaces, they should be united by sutures.

The pulse of the mother. Count the mother's pulse at intervals throughout labour, and especially in the third stage and after. The pulse should then become slower. If, on the other hand, it becomes faster, see if the uterus is filling with blood, is big and flabby, or if there is external haemorrhage. Patients who have been given

chloroform are apt to have a rapid pulse which is of no significance.

Cleaning the patient. In private practice we always wash the vulva ourselves. Put the patient on her left side, with the hips over the side of the bed. Separate the thighs a little, enough to enable you to sponge efficiently, but if the perineum is torn, both now and during the puerperium the thighs must not be widely separated. Use pledgets of sterile cotton-wool soaked in weak lysol (half per cent.), and wipe from before backwards, throwing away each pledget after one wipe with it. Lysol washes away the clotted blood that clings to the vulval hairs better than any other antiseptic, and avoids the necessity of soap and water. It makes the patient smart if too strong. Do not open the labia, but wipe over the closed vulva. It is only necessary to wipe the mucous surfaces of the labia minora before a vaginal examination, and vaginal examinations are not needed after the child is born. Tell the nurse to clean the vulva in a similar manner during the puerperium. It is better than wiping into a bed-pan, which is also used for the evacuation of the bowels. If the nurse asks how often she is to do this, tell her as often as the lochia shows through the aseptic pad, and at least every six hours.

The pad. When the vulva has been wiped, the patient is turned on her back again. Then lift her back and wipe her buttocks dry with a towel. At the same time the nurse pulls away the draw-sheet and upper mackintosh into the bath. Put the pad between her legs, and she then lies down on the binder. The pads are made of Gamgee tissue, and are about ten inches long by four inches wide and two inches thick. They are scorched brown on one side at the fire, and the scorched part when cool is put next to the vulva. Dry pads are better than wet ones. Wet pads are uncomfortable.

Uses of the binder. The binder brings a sense of support to the patient, and as a rule patients like to have a binder for this reason. It also keeps the legs together, if the perineum has been torn. Puerperal women, too, suffer from flatulence, and a binder opposes the distension of the abdomen.

How to fit the binder. The patient is already lying on the binder. The lower border should be at least two inches below the trochanters. Pin the binder from below upwards with the edge furthest from you overlapping the one nearest. Four stout pins are needed. Make it tight by pulling the ends in opposite directions, passing one hand under the other and nipping the binder with thumb and finger before pinning. We use stout straight pins, and pin transversely, leaving the point of the pin between the folds of the binder. One pin is fixed near the lower border of the binder, the next over the pubes, the next between the pubes and umbilicus, and the last, which need not hold so tightly, above the umbilicus.

When to put on and take off the binder. It is usual to put on the binder about half an hour after the delivery of the afterbirth, provided there is no post-partum haemorrhage. It is worn until the patient begins to walk about.

The baby. The baby has been wrapped up in a blanket or in flannel and put on the bed or elsewhere, whilst the mother has been made comfortable. Take the baby and examine it for defects, such as cleft palate or imperforate anus. If there is any suspicion that the mother has had a vaginal discharge during pregnancy, drop two drops of 1 per cent. silver nitrate into each eye. This prophylactic of Credé's against ophthalmia neonatorum is of the greatest importance, and you should always inquire from the mother if she has noticed any vaginal discharge during pregnancy.

The baby's toilet. The best way to get rid of the vernix caseosa is to rub the skin with a little oil before using soap and water. It disappears of itself in a few hours. Do not let the nurse put enough water in the bath to totally immerse the baby. The temperature should be about 100° F. Dry the cord carefully. We think a small sterile pad of cotton-wool scorched at the fire on both sides as good a dressing as any for the cord. Dust it with a powder of boracic acid 1 part, zinc oxide 3 parts, and starch 6 parts. Slit the scorched pad to the centre, slip the cord along this slit and fold the pad over the cord. See that the swather is not too tight to allow the freest respiration.

Sewing the clothes on is better than pinning them, for a pin may run into the baby.

Ergot. We do not give ergot in normal cases.

When to leave. In a properly conducted case of midwifery, the attendant should not leave until an hour has elapsed from the delivery of the afterbirth. Little complications may arise. The baby's cord may bleed. The uterus may fill with blood clots and discharge them, which may be accompanied by alarming shock. True post-partum haemorrhage may occur. Such cases are not rare.

Watch the pulse and see that it becomes slower, or at any rate not faster. Occasionally feel the uterus to see that it keeps well contracted and retracted. Take the patient's temperature and pulse, and make a note of them with the nature of labour, &c., in your notebook. Tell the nurse to put the baby to the breast for a few minutes, when she is ready to do so. This trains the baby to the nipple, stimulates the milk flow, and helps the contraction of the uterus. Let the patient sleep, but do not draw down the blind, for in the dark any facial pallor due to loss of blood cannot be detected. She may have some toast and tea, if she wishes it. Tell the nurse to see that the patient passes her water within eight hours. The best way she can do this is to roll over on her hands and knees. No harm ever results from this. Having given these instructions, you may now leave.

Year 1910
 Month January
 ROTUNDA HOSPITAL. BED No. 38

Name *Christina Hall* Age 22 Height 5 ft. 2 ins Weight 9 st. 0 lbs
 Admitted Jan. 20th at A.M. 4.00 P.M. No. of Pregnancy 2 Period of Pregnancy 36 wks. 1

Previous Labours *Normal* Abortions *None* Premature *None* Full Term *One*
 Date of Last Labour *March 19, 1908* Last Menstruation commenced *April 16, 1908*
 State of health during Pregnancy *Good* Health on Admission *Good*
 Temperature on Admission *97.2* Pulse on Admission *90*
 Pelvic Measurements, E.C. 20 In. Cx 37 1/2 Is. Sp. 20 In. Co. *Trunk* *Birth*

Abdominal Palpation
Second, Third, Fourth, Heart, 10

Vaginal Examination
As 1/2 dilated Membranes ruptured, Head presents 30° 1' 2.5° Head, back 1/4 fully dilated Membranes ruptured, Head down 23° 1' 5.25° Head, back

Labour and Delivery
 Labour commenced 23rd of Jan'y at 10.00 a.m. p.m. Membranes ruptured A.M. 6.15 p.m. Jan. 23
 Infant Born 5.55 P.M. January 23, 1910 Placenta delivered 230 minutes
 Presentation *Vertex* Position *Head* Nature of Labour *Normal*
 Membranes *Complete* Placenta *Complete*
 Examined before admission *Perineum* *Subst.*
 Student *R. M. Gray* Nurse in charge *Mrs. W. Smith*

Date of first leaving bed *January 23, 1910*
 Date of discharge *January 31, 1910* Condition when leaving Hospital *Provedent*
 Day Nurse in charge *Thomas* Night Nurse in charge *Brown*

Notes - *Rectal examination appeared normal*

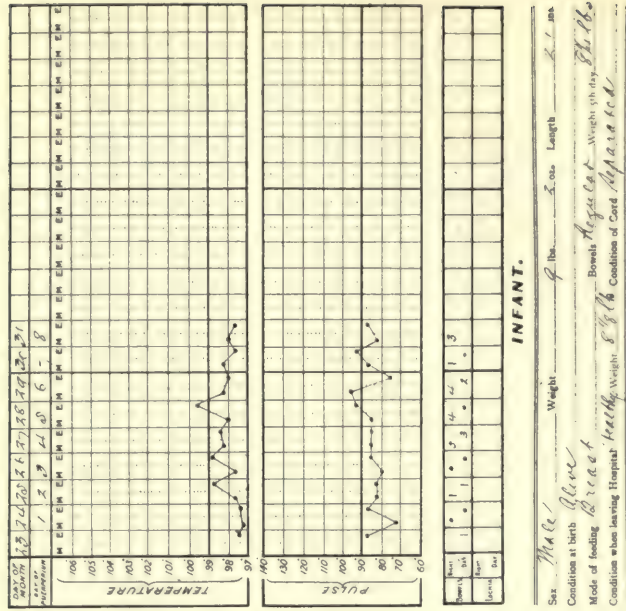


Fig. 44. Chart of normal delivery, as used in the Rotunda.

CHAPTER V

CARE OF THE NORMAL PUERPERAL WOMAN

The first visit is made within fourteen hours of the birth of the child. We make daily visits for the next six days, and then a visit every other day for fourteen days.

The conditions to note at a visit are, the temperature and pulse of the patient, the height of the uterus, the lochia, the state of the breasts, the bowels, passing of urine, the diet and amount of sleep, and the ventilation of the room. Attention to the baby will be described in the chapter on the infant.

The temperature. In the first twenty-four hours the patient's temperature is very likely to rise. This constitutes the unstable period. But if the temperature is raised above 99° F. after the first twenty-four hours, a cause must be sought.

The pulse. Similarly, if the pulse after the first twenty-four hours rises above 90, a cause must be sought. The temperature then should remain at or below 99°, and the pulse at or below 90 in a normal puerperium. In a nervous patient the pulse-rate rises when you go into the room, but falls as she gets accustomed to your presence.

The height of the uterus. The big pregnant uterus, owing to contraction and retraction, instead of being red with blood, becomes pale and anaemic. The starved hypertrophied muscle fibres undergo fatty degeneration and atrophy to the size of ordinary muscle fibres, and at the end of six weeks the uterus is but little larger than the original virgin uterus. At the end of about fourteen days the uterus should be once more a pelvic organ. Its rate of 'involution', as this degenerative process is called,

varies greatly in women, and little is gained by learning how high the uterus should be on a particular day. What should be noted is the gradual nature of the process. If a sudden dropping of the uterus occurs, it suggests the sudden bending forwards or backwards of the body of the uterus, namely acute anteflexion or retroflexion.

The lochia. The lochia is the fluid that oozes principally from the placental site, but also from the walls of the uterus, and from lacerations of the cervix, vagina, or perineum. It is largely blood for three or four days, and is called Lochia Rubra. From the fourth to the seventh day it assumes more the nature of serum, and is known as Lochia Serosa. After this it becomes white, Lochia Alba. The lochia ceases about the fourteenth day. As in the case of involution of the uterus, the important point to notice is the gradual change in the nature and amount of discharge from day to day, rather than its exact nature on any particular day. Normally, the lochia is free from pathogenic germs, and has a peculiar, but not foetid, smell. Tell the nurse to look for blood clots or pieces of membrane in the lochia.

The breasts. If the breasts are squeezed on the day of delivery, a yellow fluid exudes from the nipple. This is called colostrum. The colostrum is replaced by the milk on the third or fourth day. Before each feed to the baby, cleanse the nipples with clean cotton-wool and clean water. After each feed wipe away any remnant of milk with damp cotton-wool, and then wash with Eau de Cologne or some other alcoholic preparation to harden the epithelium.

The bowels. A woman's bowels are apt to be confined whilst she is lying in bed. Give her a purge, such as a pill of compound colocynth and blue mass (with Apenta water or salts in the morning), on the evening of the second day. An enema may be necessary. We let her sit up on the bed-chamber when the bowels are opened. Give her medicine (cascara tabloids as required) after this to keep her bowels opened once a day. We do not find that a purge to the mother often affects the child.

The urine. From the first, the patient may roll over on

her hands and knees to urinate, keeping her thighs pressed together, if she has had a torn perineum. If this fails, and she has not urinated for twelve hours, pass a catheter by sight, first sponging the mouth of the urethra with biniodide of mercury (1-2000). There will be no need to pass a catheter again in a normal case. Avoid doing so, if possible, for a woman is liable to get a catheter habit. Some women do not empty the bladder sufficiently and a large accumulation results, forming a palpable tumour, dull on percussion, above the pubes. This should always be looked for, as it is likely to lead to atony and cystitis with persistent dribbling, if allowed to persist (see p. 165).

Diet. For the first two days the diet should be light. Our patients in hospital have soup, milk, bread, and arrow-root. After the bowels have acted she may have fish, and after that anything she can digest. She should not eat so much that she gets dyspepsia. Let her have plenty of fluid and milk, but only at her meals. She may have stout, if she likes, but there is no exceptional merit in stout. The diet of the nursing mother is also described in the section on the infant.

Sleep. On the night after her baby is born, a woman frequently does not sleep well, but on the following night she should sleep without a hypnotic. If she does not the case presents serious features. Absence of sleep often is the forerunner of puerperal insanity, or a symptom of sepsis. Veronal, seven to ten grains, is less objectionable than other hypnotic, if one is required. It is a wise precaution to take the child out of the room at night, particularly if its restlessness disturbs the mother.

The room. See that the windows are kept open, and the room is not stuffy. An open window day and night is good for the baby, and will not give it cold. The mother can have the blinds down if she likes, but there is no need for them to be down. It is not well to treat her too much as an invalid, for women are very open to suggestion, and are very ready to fancy themselves delicate, if others suggest that they are.

Visitors. The patient may see her husband, but if she is

an excitable woman, keep other people from her for the first three days.

Afterpains. Afterpains are usually due to clots in the uterus. Massage the uterus, and squeeze out the clots, and give ergot ʒj twice a day either alone or with liquor morphinae (m x to xx).

When can she get up? We keep our patients in bed until the uterus has become a pelvic organ, and the lochia has ceased or is very slight, that is, between the tenth and fourteenth days. If the lochia becomes red, as the result of getting up, the patient had better stay another day or two in bed. A woman should not stay in bed longer than a fortnight, unless there are good reasons for doing so. Our hospital patients get up on the seventh day, and go out on the eighth. We think this is too early.

A woman may sit up in bed on the fifth day, and before that on the bed-chamber whenever the bowels are opened. She may go out after she has been up for five or six days.

Douching. Normal cases need no douching either before or after labour.

Exercise during the puerperium. Muscular tone is often very deficient after childbirth, and the condition is apt to be made worse by prolonged stay in bed. For this reason it is desirable that early efforts be made to exercise the different groups of muscles throughout the puerperium. Voluntary movements of the legs, arms, and abdominal muscles can be made in the manner that will suggest itself to any intelligent practitioner. Pleasant fatigue should be aimed at and exhaustion avoided.

PART II

ABNORMALITIES OF PREGNANCY

CHAPTER VI

ABNORMALITIES DUE TO SOME SEPARATION OF THE OVUM
FROM ITS IMPLANTATION SITE — CONDITIONS RE-
SEMBLING THESE CLINICALLY

**Abortion—Miscarriage and Premature Labour—Vesicular
Mole—Extra-Uterine Pregnancy—Accidental Haemor-
rhage and Placenta Praevia—Hydorrhoea Gravidarum
—Polypus—Cancer.**

WHENEVER there is separation of the ovum from its im-
plantation site, whether partial or complete, bleeding takes
place. As a rule the blood appears at the vulva.

The abnormalities that are included under the above head-
ing are (1) abortion, (2) miscarriage, (3) premature labour—
different names for the same condition occurring at different
periods of pregnancy; (4) extra-uterine pregnancy, (5) vesi-
cular mole—both allied in nature to abortion, but modified,
the first by the position, the second by the degeneration of the
ovum; (6) accidental haemorrhage, (7) placenta praevia—
both allied in nature to a threatened abortion; and lastly,
(8) hydorrhoea gravidarum, (9) polypus, (10) cancer—
included here, because the signs to which they give rise
may be mistaken for abortion.

The practical value of grouping these together in this way
will be seen by their resemblances and differences as well as
by the similarity of the principles of treatment applied to
them. For example, when bleeding is severe, whether due to

abortion, vesicular mole, accidental haemorrhage, or extra-uterine pregnancy, the safety of the patient depends on the speed with which complete separation of the ovum takes place, and treatment is devoted to bringing about this separation as rapidly as possible.

Structures concerned in abortion, miscarriage, and premature labour. Before entering into a description of the early expulsion of the ovum, it is necessary to briefly describe the structures concerned in the process.

When the fertilized ovum enters the uterus it becomes embedded in the endometrium, which is then termed the decidua. The superficial decidual cells lose their cylindrical character and become flattened. Between these cells there is an increase of the stroma composed of spindle and star-shaped connective tissue cells. This layer is known as the compact layer, and deep to it is a spongy tissue formed by the hypertrophy of the uterine glands. It is through the glandular layer of the decidua in relation to the placenta that the separation of that organ eventually takes place.

The parts of the decidua are variously named according to their relation with the ovum. The decidua that lines the uterine cavity to the internal os is termed the decidua vera; the decidua that grows over the ovum, which sinks into the decidua as a seed sinks into soil, is termed the decidua reflexa, and possesses no glands; the decidua which lies between the ovum and the adjacent uterine wall is termed the decidua serotina. The layer of epithelial cells surrounding the ovum has a phagocytic character and is known as the trophoblast. It eats into the maternal decidua and capillaries, and hollows out spaces from them which are filled with blood and known as the maternal sinuses. Into the buds of trophoblastic cells pass foetal blood-vessels, which are only separated from the blood of the maternal sinuses by two layers of cells, which are formed from the conversion of the trophoblastic cells. The outer of these layers is known as the syncytium, the inner as Langhan's layer.

Having performed the necessary excavation the trophoblastic cells form a double-layered coating to the foetal

blood-vessels, and this foetal vascular product floating in the maternal blood sinuses is known as a chorionic villus. Some of the villi float freely in the maternal blood, others are fixed at their tips to the uterine membrane forming the anchoring villi. The interchange through the thin coating of two layers of cells between the blood of the foetal vessels and the blood of the maternal sinuses provides for the nourishment, respiration, and excretion of the foetus.

The chorionic villi at first cover the whole ovum, but about the end of the third month, those that are in relation with the hypertrophied decidua serotina have, with the decidual tissue, formed the placenta, while those in relation with the decidua reflexa have withered.

From this time onwards the placenta forms the organ of communication between the foetus and the mother. It continues to grow in size, and at birth it weighs about a pound and is some 7 inches in diameter. The umbilical cord, passing from the umbilicus of the foetus to the placenta, carries the foetal blood-vessels in which the blood passes to the placenta in the two umbilical arteries and from the placenta in the single umbilical vein. The foetal blood-vessels are enclosed in Wharton's jelly.

Estimation of the age of the foetus. It is often important, especially in medico-legal cases, to be able to estimate the age of the foetus. Different ova develop with different degrees of rapidity, and the following account helps to an opinion, which cannot be considered strictly accurate, but is at the most approximate. One method of making an approximate estimation is by the length of the embryo.

The following table in centimetres forms a convenient way of remembering the length. Up to the fifth month the length of the foetus for the several months is found by multiplying the number of the month by its own figure. After the fifth month, the number of the month is multiplied by 5. Approximately 2.5 centimetres equal one inch.

End of the	1st month	$1 \times 1 = 1$ cm.
„ „	2nd „	$2 \times 2 = 4$ cm.
„ „	3rd „	$3 \times 3 = 9$ cm.
„ „	4th „	$4 \times 4 = 16$ cm.

End of the	5th month	$5 \times 5 = 25$ cm.
" "	6th "	$6 \times 5 = 30$ cm.
" "	7th "	$7 \times 5 = 35$ cm.
" "	8th "	$8 \times 5 = 40$ cm.
" "	9th "	$9 \times 5 = 45$ cm.
" "	10th "	$10 \times 5 = 50$ cm.

End of the first lunar month. The ovum at the end of the first month is about one centimetre long. The eyes, ears, and nose appear.

End of the second month. The ovum is about four centimetres long and is coated with villi. In the embryo the external genitals appear and ossification centres can be found in the lower jaw and clavicle.

End of the third month. The ovum is about nine centimetres long and the placenta is now formed. The umbilical cord shows spiral turns, the fingers and toes are differentiated, the nails can be detected, and the thorax is differentiated from the abdomen.

End of the fourth month. The sex becomes distinguishable and hair appears upon the head.

End of the fifth month. The fine hair, known as lanugo, covers the surface of the body. The foetus has a withered appearance, the skin being red and wrinkled from the absence of subcutaneous fat, and the head very large compared to the rest of the body.

End of the sixth month. The eyelids separate. The foetus, if born, may live a few hours.

End of the seventh month. The child, if born alive, may live a few days, but even at the end of the twenty-eighth week can scarcely be called viable.

End of the eighth month. The child is born alive and can be reared. The lanugo is disappearing from the face, the nails have nearly reached the tips of the fingers, and in a boy one testicle may be found descended into the scrotum.

End of the ninth month. The skin has by now lost most of its wrinkled appearance owing to a subcutaneous deposition of fat. The lanugo is disappearing from the body.

End of the tenth month. The full term child measures

50 centimetres, or about 20 inches. The weight of a child is so variable that it is no indication of its age.

ABORTION

By *abortion* is meant the death of the ovum before the end of the third month. When the dead ovum is expelled into the cervical canal and retained there by the closed external os, the condition is called a *cervical abortion*. When part of the ovum is expelled from and part retained in the uterus, it is called an *incomplete abortion*. When the ovum dies, but is not expelled from the uterus, it is a *missed abortion*. When the ovum dies and is expelled in its entirety through the external os, it is a *complete abortion*. When some of the ovum is detached, but as a whole it continues to live, the condition is known as a *threatened abortion*.

Causes of abortion. Abortion is a very common occurrence. About fifty per cent. of married women have either one or more abortions. Yet it is by no means possible to assign a cause to every case.

Amongst the important predisposing causes of abortions are poisons, syphilis or diseases that lead to an unhealthy endometrium. Diseases of the foetal membranes themselves, which may lead to abortion, are little understood and cannot be prevented.

1. The diseases which may lead to an unhealthy endometrium are (1) heart disease, (2) kidney disease, (3) liver disease, (4) septic endometritis, (5) displacements of the uterus, (6) myomata in the uterine walls, (7) pelvic disease which leads to pelvic congestion, (8) arterio-sclerosis, (9) gout, and (10) constipation. If a woman has had an abortion, examine her six weeks afterwards, both gynaecologically and medically, to find out if any of these conditions are present.

2. *Poisons.* Lead poisoning (diachylon plaster) and gas poisoning occasionally cause abortion. All oxytocic drugs have to be given in poisonous doses to induce abortion, and frequently cause death.

3. *Syphilis.* Syphilis may lead to an unhealthy endometrium or disease of the foetus. If there is any suspicion

of parental syphilis, the diagnosis can be verified by Wassermann's serum reaction. Put the parent that gives the positive reaction through a course of treatment.

4. A fall or injury sometimes determines abortion, but will not do so in a healthy woman, unless it is both direct and violent.

5. Lastly, remember the possibility of criminal abortion.

Symptoms and signs. Separation of the ovum leads to bleeding, so the first sign a woman has that she may abort is haemorrhage. Contractions of the uterus are set up, and so the patient has pain of an irregularly intermittent nature.

When the pain is regular and intermittent, the expulsion of the ovum is to be expected, for these contractions are of a nature similar to labour pains, the pain being due to the opening of the internal os.

Send the patient to bed if she is not already in bed, and make a vaginal examination, with exactly the same careful attention to cleanliness as if full term labour were commencing. Note the signs of pregnancy, such as blueing of the vulva and vagina, softness of the cervix, and corresponding size of the uterus to the patient's history of amenorrhoea. There will very likely be clots of blood in the vagina if the patient has been in bed. Keep them for examination. Then feel the os and cervix. If the abortion is complete, the cervix feels pear-shaped with the apex up, if incomplete pear-shaped with the apex down. A little experience makes this a useful distinction. If the internal os is open, abortion is very likely, but not certain to follow. The ovum may be protruded into the cervical canal in some few cases. This partial expulsion of the ovum from the body of the uterus is a stage of abortion which has now passed beyond that of threatened abortion. Blood clot in the canal may be mistaken for the ovum, but blood clot can be broken up with the finger tip.

Examine from a diagnostic point of view to exclude extra-uterine pregnancy and vesicular mole. In extra-uterine pregnancy a tender mass is usually found either behind or to the side of the uterus and separated from it by a groove. Suspect vesicular mole when the size of the

uterus does not correspond to the stated period of pregnancy and feels doughy. If you find the characteristic 'white currant' cysts embedded in 'red jelly' clot, the case is one of vesicular mole. Finally, examine the rectum for scybala. These masses can be felt through the posterior vaginal wall; they pit on pressure, and are not sensitive.



FIG. 45. Ovum from twelve to fourteen days old, showing the chorionic villi. Natural size. (By permission of Mr. J. Keogh Murphy.) Rotunda Hospital specimen.

Examination of clots, &c. The nurse should always keep anything that comes away, for the doctor to see. Sometimes the patient does so too. Examine blood clots and 'lumps of flesh' carefully for bits of ovum, or for 'white currants embedded in red jelly', which are the certain sign of vesicular mole, or for a decidual membrane which forms a complete cast of the interior of the uterus, and is expelled in some cases of extra-uterine pregnancy (see page 111).

The figures show some of the different appearances of abortions. Sometimes the blood, instead of escaping through the os, is extravasated into the decidua



FIG. 46. Embryo about 23 days' old lying in the opened chorionic sac. Natural size. Rotunda Hospital specimen.

outside the membranes, and the ovum becomes a mass of blood clot with withering or absorption of the foetus. This is known as a carneous mole.



FIG. 47. The same embryo as in fig. 46 ; magnified. The large yolk-sac is well seen, and the outline of the small amniac cavity surrounds the head and dorsal aspect of the embryo. Photographs by Professor A. F. Dixon.

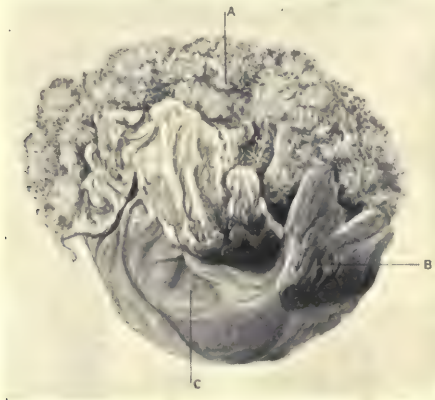


FIG. 48. Complete abortion, of about three months. The decidua has remained in the uterus. A, chorionic villi ; B, blood clot ; c, embryo. (Rotunda specimen.)

Treatment. Having excluded extra-uterine pregnancy by vaginal examination, and having no reason to suppose the case to be one of vesicular mole, you have to deal with far the commonest cause of bleeding in the early months of

pregnancy, namely, abortion. But unless the whole ovum has been expelled and kept for examination it is impossible as a rule to decide whether the ovum is alive or dead. If part of the ovum is in the cervical canal the ovum is certainly dead, but such cases are rare. The rule for treatment is to remove a dead ovum from the uterus, or the remnants of a dead ovum, but not a living ovum. But it is impossible in most cases to be sure whether the ovum is alive or dead.

If the entire ovum has been expelled, treat the patient much as if she had had a full-time child. Keep her in bed until red lochia has ceased, keep the vulva scrupulously clean, let her wear scorched pads, keep her bowels opened, attend to her diet, sleep, the ventilation of her room, and give her ergot if she has afterpains. Do not douche her or make unnecessary vaginal examinations.

If part of the ovum is in the cervical canal, or has been discharged, the treatment is to empty the uterus.

All other cases should be treated as threatened abortion, unless constitutional symptoms arise. Some fifty per cent. of threatened abortions, when treated, go to full term.

To treat a threatened abortion. Put the patient to bed and keep her there until all pain and bleeding have ceased for five days. Constipation is practically sure to be present, and is a fruitful cause of abortions; therefore give the patient some salts or any laxative she is accustomed to take, and a small enema, but not a violent purge. One drachm of castor oil in coffee every four hours as a rule acts well, or an enema of ten ounces of olive oil. If the uterus is retroverted, anteflex it, using bullet forceps if necessary, and put in a pessary (*see* under Retroverted gravid uterus, pp. 167-9). As regards drugs, if there is much pain and restlessness, we give opium. Calcium lactate (3ss. to 3j, as a powder) is said to increase the coagulability of the blood and therefore to stop bleeding, and we give it.

The cessation of bleeding can be diagnosed by the colour of the blood and clots. Recent blood is red. Old blood is darker.

When all symptoms have ceased for five days, allow

the patient to get up, but keep her very quiet. She must avoid much exercise and coitus. Bleeding is apt to recur. If it does so, tell her to go to bed and send for you.

We insist once more on this treatment of cases in which there is doubt as to whether the ovum is dead or alive. Treat them as threatened abortions, that is, treat them as if the ovum were still living, and there is hope that by care it may be brought to full term. As this favourable result is frequently attained, every care and attention is fully repaid. Unless this maxim is adopted, there may be needless sacrifice of foetal life. If you judge that an abortion is 'inevitable' by the size of the os, the amount of blood lost, and the character of the pains, you will sometimes destroy an ovum that would otherwise continue to live. Therefore we would be glad to 'see the word 'inevitable' in relation to abortion expunged. Even when inevitable, the natural efforts of the uterus succeed in the great majority of cases in expelling the ovum, and it is not necessary to interfere.

When to empty the uterus.

1. If, in spite of keeping the patient in bed, dribbling of blood continues for six weeks. We then feel justified in treating the case as one of dead ovum.

2. In those cases where part of the ovum can be felt protruding into the cervical canal.

3. When the diagnosis of cervical abortion has been made. The dead ovum is lodged in the cervical canal, but the external os is tightly closed. The cervical canal is bulged and the cervix, instead of being conical, is as wide as it is long.

4. When incomplete abortion has been diagnosed, either by a clear and concise history of the foetus being seen or by finding a portion of the ovum in the blood clot. (Incomplete abortion or miscarriage is more common after the formation of the placenta at the end of the third month.) In these cases one of two things happens. The uterus will eventually expel the rest of the ovum. But as each piece separates a fresh haemorrhage takes place, to be followed by a brown discharge, and later by another haemorrhage. There is therefore a series of recurrent haemorrhages.

Secondly, the remnants may putrefy and give rise to foul lochia and sapraemia. The signs of a living ovum and advancing pregnancy cease.

5. When missed abortion is diagnosed this is recognized by finding that the signs of advancing pregnancy cease; some cases have the same signs as in incomplete abortion, namely, repeated haemorrhages and brown discharge, or brown discharge and sapraemia. The patient will have had amenorrhoea for several months, but the size of the uterus does not correspond to the supposed period of pregnancy. This with the brown discharge or haemorrhage should suffice to establish the diagnosis.

6. When constitutional symptoms arise in the mother, such as pallor from the amount of blood she has lost, rigors, or rise of pulse and temperature.

How to empty the uterus. We will first describe the technique that applies to a case when the internal os will admit one and probably two fingers into the uterine cavity. If compelled to empty the uterus owing to the great loss of blood in a threatened abortion, the os is almost always sufficiently open to admit one or two fingers. If it is not, it is more likely that you have been unduly alarmed, than that there is need to empty the uterus.

Enema. If the rectum is full, first get the nurse to give an enema.

Position of patient. She lies on her back in the cross-bed position with her hips well out so that the vulva projects just over the edge of the bed. She lies on a mackintosh which hangs over the side with its end dipping into the bath. Rest her feet on chairs and cover her body and legs with a blanket.

Anaesthesia. If she is nervous and resists, it is better to give her an anaesthetic. If she keeps her abdominal muscles tense, she must be anaesthetized. If she has not had a full-term child she must be anaesthetized, for you have to pass at least your half hand, that is, the hand without the thumb, into the vagina. In other cases an anaesthetic is not needed.

Instruments, &c. The instruments needed will be a

douche-can or Rotunda douche, a catheter, a vaginal nozzle, and a large and a small Bozemann's catheter. We wear rubber gloves. Also have a Rheinstädter's flushing spoon curette; some iodoform gauze; pledgets of sterile wool in a small basin with boiling water, a little lysol, and a piece of soap in it; a pair of tongue or other forceps; plugging forceps; and, lastly, a clean jug or douche-can, filled with douching solution. We either use plain salt solution at a



FIG. 49. Bozemann's uterine catheter.

temperature of about 100° – 105° F., or creolin ($\frac{3}{4}$ ss. to the gallon). The creolin solution is made up first with cold water from the tap. Tap water very rarely contains pathogenic germs, and if it did, we hope the creolin would kill them. Boiling water from a kettle is added by the nurse, before the douche is given.

The necessity for antiseptics. We have said we sometimes use creolin. We do not use it in strong solution, nor do we rely on it, but use it chiefly on the grounds that it is relatively non-poisonous, does not seem to do harm, and may do good. The modern tendency is not to rely on antiseptics, but to place trust in plenty of soap and water. Antiseptics are a real danger if, relying on their power, nurses or doctors slacken the care with which they clean—their hands by vigorous scrubbing, the external genitals by washing with soap and water, and any instruments that are likely to be used by boiling.

Cleansing the hands. The hands are cleansed by scrubbing them with a boiled nail-brush with soap and water for four minutes, rinsing the soap thoroughly from the hands with plain water, soaking the hands for one minute in biniodide of mercury (1–1000), and wearing boiled rubber gloves. It is advisable to wash off the biniodide and apply a good soap lather to the hands before slipping on gloves.

Doctor's position. Sit on a chair between the patient's legs. Her legs are held up by the nurse or assistant, or, if she is not anaesthetized, she puts her feet on chairs, and between them is a chair on which you sit. Wear a long mackintosh, which covers your knees, and the lower edge of which dips into the bath.

Cleansing the external genitals. The nurse has already given them a preliminary wash with soap and water. Take the forceps and pick up one of the pieces of wool from the little basin with hot water, lysol and soap. This gives a free lather, and the pubic hair and folds of the groin should be washed freely. Throw the used wool into the bath, and pick up a fresh bit and again lather, and so on. Cleanse the neighbourhood of the anus in this way, but do not rub from the anus towards the vulva; use pledgets of wool for the anal region and anal region only. With fresh soapy wool wash thoroughly the muco-cutaneous surfaces of the labia minora. Then take the end of the douche tube without any nozzle, and, after testing the heat of the douche by pressing the can or jug with your bare elbow, pinch half the exit of the douche tubing. This makes a fine jet of douche fluid. Again lather the whole surface with different bits of soapy wool, playing a fine jet of douche fluid over the parts at the same time. Rub hard with the wool. Again cleanse the muco-cutaneous surfaces of the labia minora with soapy wool and douche jet. Finally, hold the labia open with the opened forceps and play the jet over their surfaces, over the vestibule and urethral area. The external genitals are thus cleansed without touching them with your gloved hands.

Passing a catheter. It should be an invariable rule to pass a catheter before any obstetrical operation. Take the sterile catheter from the basin or dish, and, separating the cleansed labia, pass the catheter by sight.

Rationale of vaginal douching. Menge, Kroenig, and Whitridge Williams have made bacteriological examinations of over three hundred pregnant women. They found that, normally, not only are there no pathogenic organisms in the vagina, but the vaginal secretion is rendered acid by some

non-pathogenic bacilli that normally live in it, and that this acid actually kills pathogenic germs. It acts, in short, like the acid of the gastric juice, as a protective barrier against pathogenic organisms. It is owing to this discovery that routine douching before labour has been generally abandoned. But in the case of abortion, the vagina usually contains blood, blood clot, or brown uterine discharge, in all of which saprophytes can readily live and defy their enemies, the acid-secreting bacteria. Hence the necessity of thoroughly cleansing the vagina before emptying the uterus.

Douching the vagina. The can or jug is placed some three feet above patient's bed. Put two fingers into the vagina and insert the vaginal nozzle, whilst douche fluid is flowing from it. The advantage of having two fingers in the vagina is threefold. Firstly, there is no danger of fluid being forced into the vagina under pressure and then into the uterus with the foul vaginal contents; secondly, the vaginal rugae are smoothed out and every part of the smooth wall is well irrigated (the great importance of this in ridding the vagina of bacteria was long ago pointed out by Pozzi); thirdly, a free back flow of fluid is permitted, which by its mechanical impetus thoroughly flushes out the vagina.

Rub the fingers round the vaginal walls, and see that the nozzle reaches up to the vault of the vagina, first in one fornix and then in the other. About half to one gallon of fluid will be required.

The internal os is open sufficiently to permit the entrance of one or two fingers into the uterus. The ovum has now to be freed completely from its attachment to the uterine wall. The area around the vulva is now clean and the vagina also. Soap your gloved hand, so that it will slip easily into the vagina. Put the finger tips together, making the hand cone-shaped, and pass the whole hand into the vagina. If this is impossible, pass the half hand, that is, the hand without the thumb. Lay the other hand on the abdomen, interposing a sterile towel, and so keep your hand clean for the uterine douche. Steady the uterus with the abdominal hand, and push it towards the hand in the vagina. Pass the index and middle finger into the

uterus. If only one finger will pass, use the longer middle finger in preference. Explore the interior surface of the uterus and separate the ovum completely. Complete separation is essential.

It is not possible to pull the separated ovum out through the cervix with the fingers. Therefore withdraw the two fingers from the uterine cavity and place them in the anterior fornix. Anteflex the uterus with the abdominal hand and squeeze it between the abdominal and vaginal hands. This squeezes its contents into the vagina. Remove them from the vagina and examine them in a basin of cold water. If you think that everything has not come away, repeat these manœuvres again and again rather than leave membranes in the uterus. If the vulva and vagina are clean no additional harm is done by repeated exploration.

If the uterus is retroflexed put your fingers in the posterior fornix and so squeeze it bimanually. The ovum being completely freed and squeezed out of the uterus, douche out the uterus with a Bozemann's catheter.

Dangers of douching the uterus and how to avoid them.

1. Rupture of the uterus by the nozzle. Use a large round-ended nozzle, never push hard.

2. Distension of the uterus with fluid has led to death. Fluid has even been forced through the Fallopian tubes into the peritoneal cavity. Distension is avoided by using a Bozemann's catheter with its large return-flow tube. Sometimes the return tube gets blocked by a blood clot. To avoid this move the catheter gently to and fro in the uterus and watch for the free return of the fluid from the vagina.

3. The patient has died from antiseptic poisoning. Creolin is relatively non-poisonous.

4. Air has been forced into the uterus and fatal air embolism is said to have resulted. If the catheter before insertion is held with its point upwards until fluid flows out as it does from a fountain, there will be no air in it.

5. A clot of blood is said to have been forced into a vein causing fatal pulmonary embolus. To avoid this, never

have the douche-can more than three feet above the bed. A great rush of fluid is thus prevented.

How to douche the uterus. Pass two fingers into the vagina and feel for the os. Guide the Bozemann's catheter, through which fluid is flowing, into the uterus. If there is much haemorrhage, the fluid should be as hot as the patient can bear, for the hot fluid stops the bleeding. Little shreds of decidua come away with the back flow and sometimes block the catheter. If so withdraw the catheter, free its passage and reinsert it. Douche until the return is clear or only tinged with red.

Necessity of drainage. There is no necessity to drain the uterus after the removal of an abortion, unless the uterus is retroflexed, or the case septic before removal. Then pass a wick of gauze into the body of the uterus with plugging forceps, guiding the forceps into the uterus with fingers in the vagina. Leave it in for twenty-four hours. Afterpains will be thus avoided and the lochia escape more freely. Give ergot, too, in these cases.

After-treatment. If strict cleanliness has been observed, the uterus completely emptied, and if the case were not already septic, you may be content, and can assure the patient that all trouble is now over. Keep her in bed until red lochia has ceased for two days, and follow out the same treatment as is adopted after the birth of a full-time child.

What to do if the internal os will not admit one finger. No method of separating the ovum from the uterus is nearly as satisfactory as separation by the fingers. If, however, the internal os will not admit one finger it may admit a curette; then use Rheinstädter's flushing curette. If the curette is too big, either plug the vagina and cervix or dilate the os with Hegar's dilators until one finger or the curette can be passed into the uterus.

Choice of methods depends on the urgency of the case and the instruments at hand. We advise the use of a curette if possible, and if not, dilatation of the cervix.

How to curette with Rheinstädter's curette. The position of the patient and the operator is the same as already

described. The vagina has previously been douched. Use the largest Rheinstädter. A flexible stem enables you to bend it, so as to adapt it to the position of the uterus. Fit the curette to the tube of the douche and guide it into the uterus by two fingers in the vagina, whilst the douche stream is running through it. A posterior speculum, together with a bullet forceps on the anterior lip to pull down the cervix, will enable the cervix to be inspected, if there is difficulty in passing the curette. If the Rheinstädter will not pass the internal os, pass a plugging forceps into the uterus and open it so as to stretch the os. Then pass in a small Bozemann's catheter and leave it in a minute or two. You will often be able to get in the curette after doing this. In using the curette, steady the fundus with one hand laid on the patient's abdomen. There is no necessity to thoroughly scrape the whole uterine wall. Rather entangle the ovum and rupture its attachments to the uterine wall with the curette. If force is used there is a distinct danger of rupturing the soft pregnant uterus. Therefore curette as gently as possible, turning the handle of the curette systematically so that the scraper misses no part of the uterine wall. The uterine contents may be pulled out with the curette or expressed bimanually. Finally, douche out the uterus, using a Bozemann's catheter, and insert a wick of iodoform gauze. Give \mathfrak{z} j ergot twice in the day. Remove the gauze at the end of twenty-four hours. An anaesthetic is not needed.

Dilating with Hegar's dilators or metal dilators. Being forewarned, you may have taken dilators with you. After douching the vagina, catch the anterior lip with bullet forceps, guiding the forceps to the cervix by two fingers in the vagina. Pull the cervix down to the orifice of the vagina. Insert a posterior speculum, and get an assistant to hold it in its place, for you can then see better and the dilators are prevented from touching the perineum. Cleanse the lips of the external os with a pledget of wool soaked in biniodide of mercury (1-1000), start with the largest dilator that passes easily. Pass it through the internal os. Then pass the next size, and so on. When the internal os does not readily yield,

leave the dilator that fits in position for a minute or two and it will yield. Do not use force, because a tear of the cervix running up towards the fundus has resulted from forcible dilatation. By taking plenty of time you will be able eventually to pass No. 18, and then one finger can be inserted. The advantage of Hegar's dilators is that the whole operation can be done at a single sitting.

Plugging the cervix and vagina. This is a very good way to dilate the cervical canal, and the one nearly always adopted in the Rotunda Hospital, if the os internum is not sufficiently open to allow the passage of the finger or Rhin-städter's curette. The preparations are the same as for the use of Hegar's dilators, the os externum being drawn down by bullet forceps. Pass a strip of iodoform gauze up to the fundus of the uterus with plugging forceps. If you cannot do this owing to the tight internal os, pass it into the cervical canal and pack that as tight as possible with gauze. The gauze may be soaked in boiled glycerine, as it makes the cervix soft. Glycerine can be boiled in an iron spoon over a spirit lamp. Next plug the vagina with pledgets of sterile wool about the size of the closed thumb. These are sterilized by boiling in a saucepan. Then pour the water out of the saucepan and fill it up with 0.5 per cent. lysol and let the plugs soak in them. If no wool is obtainable and the patient is still bleeding, use torn handkerchiefs washed and boiled for fifteen minutes. The patient is either on her back with the perineum projecting over the edge of the bed, or she may be placed in the left lateral position. The vagina is douched. Pass the half hand or three fingers of the left hand into the vagina and pull back the perineum. The fingers act as a posterior speculum, and open the vagina widely. This makes plugging easy. Squeeze a plug as dry as possible and push it into the vault of the vagina, and repeat the process. In this way the vagina is packed tight. A large number of plugs is necessary. Hold them in with a T bandage. Give 3j of Squibb's ergot, and repeat the dose in six hours. Remove the plugs in ten hours. There will be no difficulty in finding and removing them, and frequently the complete ovum will be found lying on the top of the plug, or else it

will come out with the iodoform gauze or may be squeezed out of the uterus by bimanual compression.

A great advantage of the plug is that it stops bleeding. The patient can be left safely, if the vagina has been tightly plugged, though it is well to ask the nurse to occasionally look at the vulva and to report if any blood appears. The disadvantages of the plug are that plugging as well as removal of the plug are painful, and the presence of the plug makes the patient restless and uncomfortable. Although an anaesthetic is not necessary, it may be wise to give some tincture of opium after plugging, to keep her quiet. Again, maceration of the vagina results from the pressure of the plug, and it is occasionally followed by vaginitis, which itself may lead to infection of the uterus. This is not a result that need be feared in the great majority of cases, but it does occasionally occur. If the uterus is septic, plugging must not be adopted, for it prevents satisfactory drainage.

For these reasons, if we are able to pass a Rheinstädter's curette into the uterus, we prefer to use it rather than the vaginal plug.

When the os internum has been opened by one of these methods. If it will admit the finger, break up the ovum with the finger and squeeze the ovum out of the uterus bimanually.

If it will not admit the finger, it will certainly admit the Rheinstädter's flushing spoon curette.

Repetition. Having decided to empty the uterus, it is necessary to decide which method to select.

1. If one or two fingers can be passed into the uterus, the best method can be adopted.

2. If a finger cannot pass, try a Rheinstädter. If a Rheinstädter will not pass, you should first pass in plugging forceps and open them, thus stretching the cervical canal. Then pass in a small Bozemann's uterine catheter and leave it in position for a couple of minutes. The internal os will then permit the passage of a Rheinstädter in many cases. If it is decided to empty the uterus, because the patient has had a rigor or has a raised temperature and pulse, it is essential to empty it either with the finger or a Rheinstädter

at once. A vaginal plug dams back the putrid uterine secretion and subjects the patient to the danger of severe septic poisoning.

Cervical abortion. The treatment of a cervical abortion differs from that of the other varieties of abortion. The difficulty is due to a closed external os. The preparations, position, and douching are similar to those already described. Pass up sharp-pointed scissors to the cervix, guiding them by two fingers in the vagina. The edge of the os externum is knife-like, being stretched over the ovum. Snip this edge in four places (*see* p. 253). The snips need not be more than one-quarter to one-half inch in depth. Squeeze out the ovum bimanually. Give a hot uterine douche. The hot fluid will stop all bleeding, and there will be no necessity to suture the cervix. As an alternative method dilate the os with Hegar's dilators. We have found the latter method quite successful in these cases, and prefer it if we have the necessary instruments at hand.

MISCARRIAGE, IMMATURE AND PREMATURE LABOUR

Miscarriage is the term applied to the expulsion of the ovum from the uterus between the beginning of the fourth and the beginning of the sixth lunar months. A child born in the sixth month breathes feebly, but soon dies (immature delivery). Their causes are the same as those of abortion. Sometimes the ovum is expelled entire, but more frequently the waters rupture, the foetus is discharged, and the placenta follows or is retained. From a practical point of view there is never the same difficulty in deciding whether or not the miscarriage is complete as there is in abortion. Both foetus and placenta are too large to escape detection by the patient or nurse, and they are usually kept to be shown to the doctor. The principles of treatment are the same as those of abortion, namely, to treat the case as a threatened miscarriage, until either the ovum is expelled or the mother becomes ill.

Miscarriage is not nearly so common as abortion.

Special points of treatment. If the child is born breech

first, it not infrequently happens that the os contracts round the neck and prevents the delivery of the head. To avoid this, as soon as a foot is felt in the vagina pull upon it. This traction will extend the foetal arms at the side of the head and obliterate the groove of the neck. If the head is caught by the os, pull gently on the legs, but not too hard, for the head may become detached, if the child is dead and macerated. You will then have to catch the head with bullet or strong volsella forceps to pull it through, and this is not always easy. It is better to pass the hand into the vagina and push first one finger and then another alongside the child's neck and dilate the os with the fingers until it is large enough to permit the passage of the head. The second point of treatment deals with the delivery of the placenta. The placenta is apt to be retained. Wait an hour to see if the uterus expels it, and then try to express it by abdominal pressure on the uterus. If this does not succeed, it is better not to wait longer than one hour, for the os closes quickly, and there may be difficulty in getting your fingers into the uterus. Treat the case then exactly as a case of incomplete abortion, and remove the placenta manually, putting your whole hand into the vagina if possible. The position, vaginal and uterine douching, &c., are exactly the same as in the treatment of abortion, and the puerperium is to be managed as after normal labour.

Premature labour. When labour sets in between the twenty-eighth week and full term it is called premature labour. The child is viable, that is, it can with great care be reared. From the point of view of treatment it differs in no way from normal labour. Its causes are the same as those of abortion, with the addition that, both in twins and hydramnios, premature labour is common. Eclampsia, acute febrile conditions, lead poisoning, saturation of the blood with carbon dioxide, &c., may also lead to premature labour.

Death of the foetus. Missed labour. Just as the ovum may die before the end of the third lunar month and not be expelled, so the foetus may die after the third lunar

month and not be expelled. The first is called missed abortion, the second missed labour. The signs of both are the same, namely, cessation of the signs of progressive pregnancy, with perhaps a brown discharge, and the treatment is the same, in the first to induce abortion, and in the second to induce labour. Both missed abortion and missed labour are rare and exceptional occurrences, the rule being that a dead ovum is expelled within a few days of its death.

How to diagnose intra-uterine foetal death after the fifth lunar month. Suspect intra-uterine death when the mother states that she no longer feels the movements of the child. A caution is here necessary, for a dead child may roll about in the uterus and produce the sensation of foetal movements, but on being questioned the mother can usually distinguish between this rolling and the lively kicks of the child. Again, if after the sixth lunar month the foetal heart is not audible, suspect death of the foetus; but do not mention the suspicion to the mother, for she may develop symptoms which are popularly associated with foetal death.

Measurements will settle the diagnosis. See first that the bladder and rectum are empty. This can be done by giving a purge, and asking her to urinate before examination. Measure the greatest girth round the uterus with a steel tape measure, also from the ensiform cartilage to the top of the fundus and from the top of the fundus to the pubes. Measure her again in a week's time, and, if the foetus is dead, the measurements will possibly be actually less. If still in doubt, measure again in a fortnight, and again in three weeks. Comparing the first measurements with those taken three weeks later will determine whether the foetus is dead or alive. At the same time the breasts become flabby. If a brown discharge appears it confirms the suspicion. The temperature of the cervical canal is said to be half a degree higher than that of the vagina with living pregnancy, a difference destroyed by death of the foetus.

A dead foetus macerates, and may macerate very quickly.

By vaginal examination in missed labour you may be able to feel the loose bones of the skull, and so know the child to be dead.

Very rarely the dead foetus mummifies, and this may occur with one of twins. The dead twin is crushed by the living twin and forms a parchment-like foetus (foetus papyraceous).

Treatment. Harm will seldom come from waiting, and the diagnosis can be assured in three weeks. Sometimes, however, the membranes rupture and the dead foetus begins to putrefy. The patient then suffers from a form of blood poisoning; she is ill, and has a rise of pulse and temperature. She also has a brown vaginal discharge. Therefore, when missed labour is diagnosed, empty the uterus after a reasonable period of waiting. It must be mentioned that the death of the foetus in utero is occasionally accompanied by severe and alarming symptoms of toxæmia. We have seen ascites, albuminuria, oedema, vomiting and profound cachexia follow death of the foetus. All these symptoms rapidly disappeared when the uterus was emptied.

How to induce labour. Labour is to be induced by dilating with tents, and then, if necessary, by adding to the size of the os by digital dilatation.

Dilating with tents. Laminaria tents absorb moisture and expand by its absorption. To sterilize them, cover them with methylated spirits in Jellett's catgut sterilizer and tightly screw the top on. These boxes have burst from allowing the water that surrounds them to boil dry. This may cause serious and even fatal consequences. Put the box into a saucepan of cold water and boil it for half an hour. The tents are thus sterilized in super-heated alcohol, and should be transferred to a bottle containing absolute alcohol.

The preparations for the insertion of tents are the same as those for Hegar's dilators. Hold the tent in a pair of forceps and pass it into the cervix so that its further end projects beyond the internal os. It has to pass for about an inch and a half to secure this. Insert as many small

tents as possible side by side, for they are easy to withdraw, and great difficulty may be experienced in getting out a single one. Leave them in for twenty-four hours, keeping the patient in bed. Take them out at the end of twenty-four hours, and the cervix will be not only dilated, but soft and dilatable. The soft os produced by tents is an advantage, for its dilatation can be increased by pushing in one and then two fingers. An anaesthetic is not necessary.



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FIG. 50. Laminaria tents in alcohol.

Emptying the uterus. The preparations are the same as those described under abortion. The patient is anaesthetized. With the whole hand in the vagina push the index finger past the internal os. Push the middle finger up alongside it, steadying the uterus with a hand on the abdomen.

Then push the thumb up between the index and middle fingers. The size of the os will now suffice for bipolar version (*see* p. 138). Catch the foot of the foetus and pull it gently out of the uterus. After extracting the foetus, remove the placenta manually. Douche the uterus. Put in a long strip of iodoform gauze and remove this in twenty-four hours. The case is then treated like other puerperal cases.

Frommer's dilator or de Seigneux's dilator. If one of these instruments is available, it is useful in these cases, above all, if there is any sepsis it should be used in the place of tents. After the usual preparations, pass the dilating end into the cervical canal and very gradually dilate. Dilatation may take considerably over half an hour. Laceration of the cervix is extremely likely to occur with this instrument (as also with forcible digital dilatation). The tear is sometimes dangerously deep and runs up into the body of the uterus when dilatation has been hurried. Slighter lacerations as a rule heal well.

VESICULAR OR HYDATIDIFORM MOLE

We now come to a special form of abortion, namely, hydatidiform or vesicular mole. It is also called myxoma chorii. In this disease there is a cystic proliferation of the chorionic villi. Consequently the disease must start before the formation of the placenta, namely, before the end of the third lunar month. The cysts resemble a number of irregular beads or little bladders strung together, containing clear viscid fluid, and the mole itself is simply a bunch of cysts, for the embryo dies and is absorbed. It is a very rare



FIG. 51. Vesicular mole. (Rotunda specimen.)

disease. We have had seven cases in hospital in the last seven years, out of 13,924 deliveries and abortions, or 1 in 1,989.

The origin of vesicular mole. When the impregnated ovum first enters the uterus, it is surrounded by a layer of large phagocytic cells called the trophoblast. These trophoblastic cells eat into the decidua, and anchor the ovum. They cease to exist after the formation of the placenta, becoming differentiated into Langhan's layer and the syncytium. But in the early months of pregnancy they burrow and eat their way into the decidual tissues. If the decidual tissues are unhealthy, as in half-starved and drunken women, or women affected by syphilis, the trophoblastic

cells of the chorionic villi are not nourished as they should be, and they become degenerate and cystic. This theory is borne out by the fact that the disease is more common in syphilitic and debauched women. Sometimes the trophoblast eats through the whole thickness of the wall of the uterus, the penetrating vesicular mole. Such infiltration of neighbouring tissue is of a malignant type, and the penetrating mole becomes closely allied to the form of malignant disease peculiar to the puerperium, known as chorion-epithelioma, or deciduoma malignum.

Growth. As a rule, a vesicular mole grows with about twice the rapidity of a normal ovum, so that the uterus of a three months' mole reaches up to the umbilicus. But some cases of vesicular mole have been reported in which the uterus was actually smaller than in a normal pregnancy.

Signs and symptoms. The patient misses one or more periods, and has the symptoms and signs of early pregnancy. She then begins to lose blood or blood-stained watery fluid from the uterus, which escapes at the vulva. The amount of blood she loses is sometimes very great. She may die from a sudden profuse haemorrhage, or she may be so weak and anaemic that the necessary operation of emptying the uterus becomes one of grave peril. In the discharge some of the chorionic cysts may be found. They look like 'white currants embedded in red jelly', and, if found, are pathognomonic of vesicular mole.

Following the rule, to make a vaginal examination whenever a pregnant woman bleeds, examine her, and in addition to the signs of pregnancy you will find the uterus is noticeably larger than the history would indicate, that it has a boggy feel, and that in spite of its size none of the foetal signs of pregnancy can be detected. The internal os, if there has been any bleeding, may admit a finger, and some of the cysts may be removed. If the cysts are not found, vesicular mole is suggested by the unusual size of the uterus and its boggy feel. If haemorrhage is not severe and diagnosis is uncertain, keep the patient in bed and have a careful watch kept for chorionic cysts in the discharge. If the haemorrhage is severe empty the uterus,

whatever the cause may be. Sometimes the uterus itself expels the mole, but never wait for this when once you have diagnosed vesicular mole.

How to empty the uterus of a vesicular mole. The preparations are similar to those for emptying a uterus in cases of abortion. If the os will admit one finger it can be dilated digitally. There is one point of importance in emptying a uterus of a vesicular mole, namely, that owing to the severe haemorrhage caused by the separation of the cysts from the uterine wall, at least four fingers should be passed into the uterus, so as to sweep away the mole quickly. Hence sufficient dilatation of the os is needed. If the loss of blood has not been severe, use laminaria tents for dilating the os. The softness of the os that they produce enables further dilatation to be readily effected by the fingers. But if the haemorrhage is severe, and the uterus has to be emptied at one sitting, give an anaesthetic and dilate the os internum up to the largest Hegar dilator. If you have no dilator, plug the vagina as for accidental haemorrhage (see p. 129). This is a very useful alternative treatment for preliminary dilatation of the os. The plug stops haemorrhage, promotes labour pains, and makes the os soft and dilatable. After dilatation, put the whole hand into the vagina, and continue dilatation with the fingers. Push in first the index and middle fingers, then the thumb, and separate them. Then push in the third and little fingers. The dilatation must be gradual, for fear of a bad tear of the cervix. Now pass three or four fingers into the uterus and scrape away the vesicular mole with semiflexed fingers, pressing the fundus down by a hand on the abdomen. At first the fundus may be out of reach, but it can be pushed within reach. Removal is easy, and skill lies chiefly in the rapidity with which it is effected. There will very likely be alarming haemorrhage, therefore immediately you have removed the mole, douche out the uterus with very hot douche fluid (115° to 118° F., or liquid that is uncomfortably hot when poured on the bared elbow). This will stop the bleeding. Pack the uterine cavity with iodoform gauze, both to form a ball upon which the uterus

can contract and to assist drainage. Give the patient two drachms of Squibb's ergot, or some other satisfactory preparation of this drug.

Take out the gauze in twenty-four hours. Experience has shown us that bleeding is apt to recur in a few days. Some of the cysts are almost certain to be left embedded in the uterine wall. When haemorrhage recurs, curette the uterus lightly with a Rheinstädter's curette, and replug with gauze. A second recurrence will necessitate a second curettage. After a fortnight has passed we use a sharp curette. We have had to curette and replug as often as six times before haemorrhage ceased to recur.

Owing to the possibility of chorion-epithelioma, send the scrapings to a competent pathologist for his opinion (p. 399).

EXTRA-UTERINE PREGNANCY OR ECTOPIC GESTATION

When the ovum is implanted outside the uterine cavity, separation from its attachment, homologous to abortion, is bound to occur. Extra-uterine pregnancy is, from a practical point of view, synonymous with tubal pregnancy. It is true that cases of ovarian pregnancy and pregnancy arising at the fimbriated end of the tube are on record. When they occur, they do not differ clinically from abdominal pregnancy due to the breaking away of the living ovum from the tube and its continued growth in the abdominal cavity. So, too, pregnancy may occur in a uterine horn, or in the interstitial (intra-uterine) part of a normal Fallopian tube. One of two things may happen, either the ovum may burst into the uterine cavity, in which case it cannot be diagnosed without laparotomy, or post-mortem examination, from an ordinary abortion, or it may burst into the peritoneal cavity, in which case it is clinically a case of tubal rupture, and its peculiar nature is only discovered at the laparotomy or autopsy. Clinically, therefore, all cases in which the ovum is nourished outside the uterine cavity are cases of tubal pregnancy, with the exception of those rare cases in which the ovum bursts into the uterine cavity and resembles an ordinary abortion.

Tubal pregnancy, from a practical point of view, may be

grouped into four classes—(1) tubal pregnancy before rupture, (2) ruptured tubal pregnancy leading to severe internal haemorrhage, (3) ruptured tubal pregnancy leading to an encysted blood tumour, (4) ruptured tubal pregnancy, in which the ovum survives rupture and continues to live either between the layers of the broad ligament or in the abdominal cavity.

Cause of tubal pregnancy. No one really knows why the ovum, which is fertilized in the Fallopian tube, should grow in the tube instead of in the uterine cavity. Possibly it is due to failure of the cilia to push the ovum into the uterus. This is hardly likely, as the action of the cilia is probably concerned with the activities of the individual cells. The occasional development of a tubal decidua, or the formation of constrictions from tubal inflammations and adhesions, may cause extra-uterine development of the ovum. Lodgment of the ovum in a diverticulum is also given as a cause. Not uncommonly a long period of sterility precedes a tubal pregnancy. The patient has a child, is sterile for some years, and then develops a tubal pregnancy. Such a history is of some little positive value, but too much stress must not be laid on it. A patient upon whom we operated for sterility, untwisting her adherent tubes and passing a fine probe down them, came back to us with a tubal pregnancy.

Course of a tubal pregnancy. The ovum gets implanted by the trophoblast into the wall of the tube, just as it does into the uterine wall. The tubal wall forms a decidua, but its decidua is feeble, and separation of the ovum from it readily takes place, with haemorrhage, strictly comparable to the separation that precedes abortion. This separation may lead to *death of the ovum*, comparable to a missed abortion, which *may then be absorbed* and so the matter end. Or blood may invade the ovum and a *tubal mole*, comparable to a uterine carneous mole, result. A tubal mole, again, may be absorbed and no more trouble result. These sequelae of tubal pregnancy are not serious. Unfortunately they cannot be foretold, and, therefore, from a practical point of view, they are overwhelmed by the more serious results. If the ovum is lodged near the fimbriated extremity of the

tube, it may be squeezed by the peristaltic action of the muscle of the tube into the peritoneal cavity, constituting a *tubal abortion*. Tubal abortion, however, is accompanied by so much haemorrhage that clinically it is the same as tubal rupture. *Tubal rupture* results in the following way: the trophoblast erodes, and the growing ovum distends the tube, so that the tube ruptures commonly in the second or third lunar month of pregnancy, or even before this. Two-thirds of the tube is enclosed by peritoneum and one-third by broad ligament tissue. Two-thirds of the tubal ova escape into the peritoneal cavity and one-third between the layers of the broad ligament. Severe haemorrhage may attend rupture, rapidly leading to the death of the patient. This is especially the case when the blood escapes into the peritoneal cavity. Less haemorrhage leads in the one case to a collection of blood in Douglas's pouch, a *pelvic haematocele*, in the other case to a collection of blood between the layers of the broad ligament, a *pelvic haematoma*. A smaller amount of haemorrhage may scarcely affect the patient constitutionally, but may permit of the escape of a live and partly separated ovum either into the peritoneal cavity or between the layers of the broad ligament. In the first case the ovum continues to live in a false sac formed by bowel, omental and peritoneal adhesions, until full term, when spurious labour sets in and results in the death of the foetus. In the second case the foetus continues to live in a false sac formed by the layers of the broad ligament. Then either the secondary sac ruptures—usually about the fifth or sixth lunar month of pregnancy—with severe haemorrhage, in marked contrast to the initial rupture that has such a slight constitutional effect on the patient that it excites no alarm, or the foetus continues to live to full term, when spurious labour sets in, resulting in the death of the foetus.

Any of these sequelae may be preceded by minor haemorrhages, which make the patient pale and give her griping, colicky pains in her lower abdomen. Practically, as already observed, they can be classified into four groups—(1) tubal pregnancy before rupture, (2) ruptured tubal pregnancy leading to severe internal haemorrhage, (3)

ruptured tubal pregnancy leading to an encysted blood tumour, (4) ruptured tubal pregnancy, in which the ovum survives rupture and continues to live either between the layers of the broad ligament or in the abdominal cavity.

1. **Tubal pregnancy before rupture.** Irregular haemorrhage from the uterus following a varying period of amenorrhoea, very often not longer than a fortnight, is the usual sign that causes the patient to seek advice. Sometimes she comes because of colicky pains. She may or may not think she is pregnant, and the fact that irregular haemorrhage may occur almost from the start confuses any menstrual history. She may have morning sickness, and her breasts may be full,

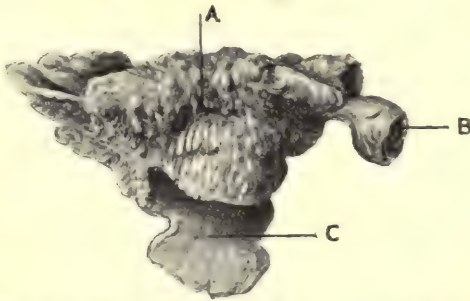


FIG. 52. Decidual cast of the uterus. A, shaggy external surface; C, smooth internal surface; B, small interstitial ovum. (Rotunda specimen.)

and this suggests pregnancy. Thus irregular haemorrhages in a married woman, especially when accompanied by colicky pains, are signs of importance and will indicate a vaginal examination. The haemorrhages are due to gradual and imperfect separation of the uterine decidua, which is formed at the same time as the tubal pregnancy. More rarely, a complete cast of the decidua is expelled from the uterus. It may be expelled before rupture, though more commonly it is expelled at the time of rupture. A complete cast looks like a little triangular jacket with three holes in it, one at the os internum and one at the mouth of either Fallopian tube. It is smooth on one side and shaggy on the other. This cast is expelled with pain and uterine haemorrhage. The patient may keep it to show, thinking she has had an abortion. It is strong, but not conclusive,

evidence of tubal pregnancy. In addition to this haemorrhage and expulsion of decidual membrane she will sometimes complain of sudden colicky pain in the lower abdomen, which may be so severe as to make her sick and faint. Always be on your guard against tubal pregnancy when a married woman complains of an altogether unexpected bout of colicky pain, which made her pale, sweat, sick, and faint.

Therefore, if the patient comes complaining of haemorrhage or a sudden attack of colicky pain of an unexpected nature, it will be wise to make a vaginal examination. The need

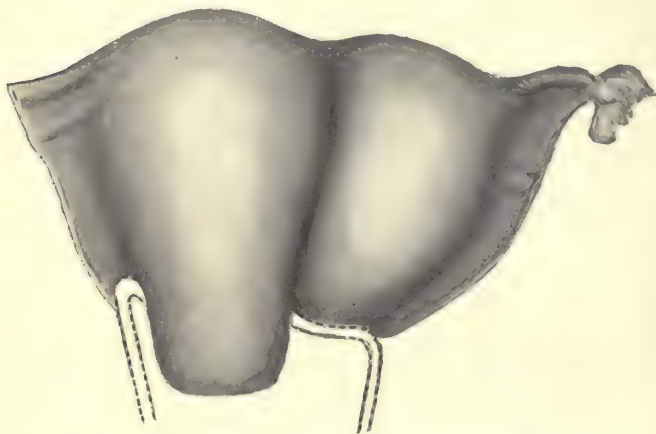


FIG. 53. Tubal pregnancy as felt by vaginal examination.

of doing so is still more imperative if there is any reason to think she is pregnant.

Diagnosis of unruptured tubal pregnancy by vaginal examination. There is a *tender*, elastic lump either behind or to the side of the uterus. Pulsation may be felt over it, but the ovarian vessels will often be felt if there is a tumour lying behind them. This tender swelling is separated from the uterus by a groove. The uterus itself is a little larger than normal, and the cervix may be beginning to get soft. This softening, however, is seldom observed.

The lump may be either an ovarian cyst or tube filled

with fluid contents from causes other than pregnancy, or a fibroid, but none of these are tender as a rule, nor are they accompanied by a history of irregular haemorrhage or colicky pains. Nor practically speaking should they be considered, for if the lump is suspected to be a tubal pregnancy, an operation to remove it should most certainly be undertaken. If it is found to be only a distended tube or ovarian cyst, by removing it the patient is benefited. As a matter of fact, if from the history and bimanual examination tubal pregnancy is suspected, it will nearly always be found to be present at operation.

You may think the patient has only a threatened abortion, but this blunder will be avoided if a vaginal examination is made when a woman consults a physician on account of haemorrhage.

A serious error is to mistake a tubal pregnancy for a retroverted gravid uterus. If there is any doubt the patient should be anaesthetized. Examine carefully, for a tubal pregnancy has been ruptured by a too vigorous vaginal examination. Attend to the following two points: (1) By bimanual palpation, the body of the uterus will be found pushed up against the pubes or to one side of the soft doughy tumour. It is sometimes impossible to distinguish the uterus from the tumour without passing a sound, which should only be done when it is certain that there is not an ovum in the uterus. (2) Although the cervix is pushed forward, the anterior vaginal wall is not stretched, as it is in retroverted gravid uterus.

If an attempt is made to anteflex a tubal pregnancy, under the belief that it is a case of retroverted uterus, it is extremely likely to cause rupture with immediate dangerous and perhaps fatal haemorrhage. The same applies to mistaking a pelvic haematocoele for a retroverted gravid uterus, and the same distinguishing signs apply.

Treatment of tubal pregnancy before rupture. All obstetricians are now agreed on the treatment of tubal pregnancy before rupture. It is to perform a laparotomy as soon after diagnosis as possible and remove the ovum with or without the tube.

Every care should be taken to ensure asepsis. A table that gives the Trendelenberg position is a great convenience but not a necessity. The preparation of the patient is the same as that described under Caesarean section (see p. 334). Avoid a large enema.

A three-inch incision is made, opening the abdomen in the median line down to the pubes. A gloved hand is passed down to the uterus, which should be the starting-point for further investigation. If adhesions make pulling up the uterus difficult, pass, by sight, a silk suture through the fundus. By this the uterus can be pulled up, providing a fixed point for breaking down adhesions. After this the tumour can always be easily felt, and it may be dragged up and out of the abdomen with the hand. A ligature at either side secures the vessels and the broad ligament is severed on both sides of the tumour. The broad ligament pedicle is now severed and the raw surface oversewn. It is advisable but not necessary to connect the stumps by a ligature and to close over the peritoneum. The ovary from which the ovum escaped can be recognized, as it contains the corpus luteum of pregnancy.

For ligatures we always employ fine silk (No. 3). It is sterilized by boiling in corrosive sublimate solution on two separate occasions.

The abdominal wall is closed in three layers.

2. Ruptured tubal pregnancy leading to severe internal haemorrhage. Rupture of a tubal pregnancy is likely to lead to the death of the mother from internal haemorrhage. There is no need for further emphasis on the need of immediate laparotomy when tubal pregnancy is diagnosed before rupture. Death may follow rupture with great rapidity. We know of a lady who, whilst putting up her hair, turned pale and faint. Her husband put her back to bed, and she died within half an hour of being in perfect health. Such cases are by no means uncommon.

Diagnosis of ruptured tubal pregnancy with internal haemorrhage. Rupture usually takes place within the first three lunar months of pregnancy, but the secondary rupture from within the layers of broad ligament may take place

any time during the later months of pregnancy, usually, however, before the sixth lunar month. Secondary rupture in these cases corresponds clinically with ordinary primary rupture, for the rupture that led to the original escape of the ovum has not been accompanied by sufficient haemorrhage to kill the ovum, that is to say, the haemorrhage and symptoms due to it are slight.

In these cases there may be a history of some weeks of pregnancy, with perhaps colicky pains and irregular slight haemorrhage. But the clinching fact in diagnosis is the sudden onset in a woman apparently healthy of the signs of internal haemorrhage. So convincing is this, that if ruptured tubal pregnancy is diagnosed an error will rarely be made.

The patient becomes very white, is in great pain, and is collapsed. A little blood and possibly a decidual cast may have escaped from the vulva, but the signs of haemorrhage are out of all proportion to this loss. The patient's pulse is very soft and rapid, and her temperature subnormal. The blood poured into the peritoneal cavity or stretching the layers of the broad ligament is the cause of the severe pain, and for the same reason she may have vomiting, hiccough, and hard abdominal muscles.

She is in great anxiety about herself, and if she is near death she will be restless and try to get up from the bed.

Treatment when there is haemorrhage threatening death. There is but one treatment, and that is immediate laparotomy. Some advise waiting until the patient has recovered from shock. But during this interval more blood may be escaping, so that even if the patient is moribund we advise an immediate operation, which is an easy one.

The operation. The preparations are made as quickly as possible and the steps of the operation down to opening the abdomen are the same as for unruptured tubal pregnancy.

When the peritoneum is incised the abdomen, which is full of fluid and clotted blood, literally overflows, and occasionally the foetus floats out on the blood. This free flow of blood is apt to be disconcerting, but is of no importance at this time. Without waiting to wash away any blood the hand is plunged down to the uterus, which is

pulled up into the incision, and the tube is clamped by sight. The hand is then passed over the tumour to the infundibulo-pelvic ligament, which is also clamped. By this means the bleeding is controlled.

Efforts should be made to restore the patient from shock (see p. 131), while the operation is being finished.

The blood is cleared out of the abdomen by washing with saline and sponging with gauze.

When the pelvis is cleared, the patient is put in the Trendelenberg position to give a clear view of the field of operation. Ligatures are substituted for clamps and the operation finished as that for unruptured tubal pregnancy.

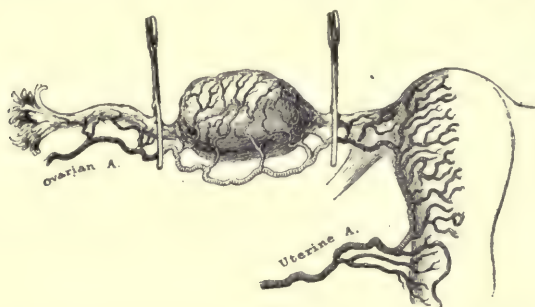


FIG. 54. Position of clamps in operation on ruptured tubal pregnancy.

Fortunately, however, this extreme hurry amidst unprepared surroundings is rarely called for, and only required in those cases where continuous haemorrhage is quickly robbing the patient of her life. Usually there is time to prepare the patient and get skilled assistance.

The rare case of rupture of an interstitial pregnancy. This nearly always bursts into the uterus. If it does not, and at the operation a case like this is found and the tube cannot be tied, sew up the rent with catgut or silk to stop the bleeding.

3. Ruptured tubal pregnancy leading to an encysted blood tumour. Sometimes the bleeding due to a ruptured tubal pregnancy is not as severe as this. The patient may have some pain and be a little pale, but her symptoms at the time of rupture may not even be urgent enough for her to

send for medical aid. More frequently, however, urgent symptoms arise, but they may not frighten the patient sufficiently to send for the doctor. She may think she has had a severe attack of indigestion. There is some vaginal haemorrhage as well, from separation of decidua. She recovers from her feeling of faintness, but in a day or two a reactionary temperature occurs, and she still has hypogastric pain. She then sends for her physician.

On making a vaginal and bimanual examination, if there has been time for some of the blood to clot a solid or semi-solid tumour will be felt, either behind the uterus in Douglas's pouch or to the side of the uterus, between the layers of the broad ligament. If the blood has not clotted in one case Douglas's pouch bulges the posterior vaginal wall, and in the other the blood in the broad ligament bulges the lateral vaginal wall. The first is called a pelvic haematocoele, the second a pelvic haematoma. A haematocoele clots in a few hours and the pelvis and abdomen are occupied by a hard tumour dome-shaped below, irregular and ill-defined above, reaching up towards or even to the umbilicus. Often the uterus can be separately palpated, elevated out of the pelvis and pushed against the abdominal wall. The patient may say she thought herself pregnant, but the usual signs of pregnancy will probably not be present.

The one thing a pelvic haematocoele should not be mistaken for is a retroverted gravid uterus, for if it is mistaken for a retroverted gravid uterus and attempts are made to replace it, it may very easily be ruptured and lead to the death of the patient. Distinguish by two signs: (1) the pelvic haematocoele uterus is pushed up against the pubic bone or a little to one side, (2) although the cervix is pushed against the pubic bone, the anterior vaginal wall is not stretched.

Treatment. When a pelvic haematocoele or haematoma forms, practically it is certain that the ovum is dead.

There are two methods of treatment: one is expectant, the other operative.

Expectant treatment. Keep the patient in bed and

attend to the normal functions of the body. At first she may have pain, for which opium in some form may be given. She will often turn a sallow colour, frequently has a temperature, feels weak, and has a bloody vaginal discharge. Whilst she has a temperature keep her on liquid diet. Give laxatives, if they are needed. Eventually during this treatment the blood clot absorbs and the patient gets well, but it may take several months. Occasionally make vaginal examinations to see that the tumour is shrinking and not increasing. More rarely it alters very little in size.

But there are distinct disadvantages to this treatment. The time required for it is long, and is apt to seriously harm a woman's estimate of her own strength and make her an invalid. The blood may be infected and an abscess form, which either is opened or else bursts into the vagina, the bowel, the rectum, the bladder, or the peritoneum, results which are obviously undesirable.

Nor is it always easy to tell when suppuration is occurring, for without suppuration a temperature is frequent. If the patient gets worse from day to day instead of better, suppuration is very likely taking place. Leucocytosis, particularly polymorphonuclear leucocytosis, strongly suggests pus, if present after the first week following the haemorrhage. The normal leucocyte count is about 9,000.

On the whole, therefore, we recommend operation, and operation is imperative (1) if the tumour increases in size or there are other signs of further bleeding, such as attacks of pain accompanied by pallor or fainting, (2) if difficulty in urinating occurs from pressure of the blood tumour, (3) if suppuration occurs.

Operative treatment. In the first two cases, that is, when there are signs of further bleeding or pressure on the bladder, following the preparations described under Caesarean Section, open the abdomen in the middle line by an incision of some three inches extending to the pubic bone. Empty the blood sac of its clots. All the clots cannot be removed, but get rid of as much as possible with the fingers or by swabbing out with gauze wipes. Douche out the cavity

left with warm saline solution. If there is oozing pack the cavity with iodoform gauze, leaving the end projecting through the wound. This is seldom necessary. Close the rest of the wound in three layers and withdraw the gauze within twenty-four hours. The operation is easy, and if carried out with aseptic precautions is safe. By it convalescence is limited to the time needed to recover from the operation, which is from a fortnight to three weeks.

In the third case, when pus has formed, it is better to open the abscess from the vagina. Open the abscess by an incision in the vaginal wall, after the vagina has been well douched. Make the incision about an inch long over the bulged vaginal wall. You will be able to see this, by inserting a posterior speculum, the patient being in the cross-bed or gynaecological position. Put a pair of bullet forceps on the posterior lip and steady the cervix whilst making the incision. Insert one finger into the abscess and clear out the breaking-down clot. Douche out the cavity either with creolin (3 ss. to Oj) or warm saline, under low pressure, not having the can or jug more than two feet above the bed. Lightly pack the cavity with iodoform gauze and leave it in for twenty-four hours. Next day, without anaesthesia, again lightly pack the cavity, and continue this treatment daily until the abscess cavity has contracted and disappeared. This process is usually completed in a comparatively short time. Warm vaginal douches during this period keep the vagina clean.

4. Ruptured tubal pregnancy, in which the ovum survives and continues to live either between the layers of the broad ligament or in the abdominal cavity. We have already dealt with secondary rupture of broad ligament pregnancy.

We cannot speak from personal experience of these cases, for we have not yet met with one. The diagnosis is made by feeling foetal parts in a tumour that is not the uterus, but displaces the uterus, which can be felt separately from it. Spurious labour sets in about full term, a decidual cast is expelled from the uterus, and the foetus dies. After this, but not before, it is permissible to pass a sound to make sure of

the diagnosis. The foetus may then shrivel, macerate, or become hardened by deposition of calcium salts into a lithopaedion. A woman has been known to carry a lithopaedion for forty years, but this is a very unlikely occurrence. Sooner or later the foetus and foetal sac become infected and suppuration occurs. The abscess may burst into the peritoneum and cause death from general peritonitis. More commonly it bursts into the bowel, bladder, uterus, or vagina. In any case it leads to continued irritation and discharge of pus. It exhausts the strength of the patient and ultimately proves fatal by either toxæmia or lardaceous disease.

Treatment. To avoid the appalling hæmorrhage that arises from pulling away the placenta whilst the foetus is alive, it is advisable to wait for three weeks after spurious labour has set in. Then the abdomen should be opened and the sac should be removed as far as possible. If it prove to be an abscess, open it from the vagina, if possible, clean out its contents and drain. Modern surgeons try to save the child's life by laparotomy before full term. Lusk, in one case, opened the sac and removed a live child. He then tied the ovarian artery, as forming the principal artery of supply to the placenta. He pulled away the placenta, plugged the cavity with iodoform gauze, stopped the bleeding in this way, and thus saved the lives of both mother and child. If we had a case, we should be inclined to try and repeat this success of Lusk's.

HYDRORRHOEA GRAVIDARUM

Watery discharge, which may or may not be tinged with blood, in rare cases flows from the pregnant uterus. It is thought to be due to a catarrhal endometritis with excessive activity of the glands. The decidua reflexa does not meet and unite with the decidua vera until the end of the third lunar month of pregnancy. The space between them is known as the decidual space, and it is from the decidua lining this space that the fluid is supposed to come. In hydrorrhoea this space is thought to be kept open by the fluid throughout pregnancy.

Symptoms. The continuous dribbling of fluid distresses the patient, and she has always to wear a diaper. In the later months of pregnancy, the fluid sometimes collects in the uterus and comes away in gushes, accompanied by uterine contractions. The patient not unnaturally thinks that the waters have broken, and she is going to have a miscarriage. These gushes may be repeated during the later months of pregnancy.

Diagnosis. In the early stages hydrorrhoea has to be distinguished from abortion, vesicular mole, or extra-uterine pregnancy. This can be done by making a bimanual examination. The fluid that is discharged, when abortion is threatening or there is extra-uterine pregnancy, is not watery but is pure blood. That from vesicular mole may be watery, but it does not stiffen linen, whereas the fluid of hydrorrhoea gravidarum does.

In the later months the condition has to be distinguished from premature rupture of the membranes. The nature of the fluid will not aid, for it is very like liquor amnii. But the other signs of labour are absent and there is the history of previous dribbling of fluid, moreover the membranes are found by vaginal examination unruptured.

Treatment. No treatment is of any avail. There is no danger to the mother, and she may be reassured about herself. She will often go to full term, although the discharge continues. Six weeks after labour the uterus should be treated for endometritis.

POLYPUS

Polypi may be either fibrous or mucous: the latter are more commonly seen in connexion with pregnancy. Both give rise to haemorrhage. The diagnosis is made by direct touch and by inspection through a speculum. It is better to remove these than leave them until full term.

CANCER

Cancer of the cervix may be the cause of bleeding in a woman who is pregnant. The diagnosis is made in the same way as cancer in a non-pregnant woman. Labour,

if allowed to occur at full time, is likely to be fatal from sepsis or to be followed by increased malignancy of the growth. The modern operation of extirpation of the uterus even in advanced cases is attended with the most encouraging results. This is particularly the case in pregnancy as the operation is then much less difficult. Bearing these considerations in mind the relative importance of the two lives must be left to the judgement of the physician and decided by circumstances. The prognosis is particularly bad in pregnancy as the disease advances with unusual rapidity (*see* p. 180).

TABLE OF DIFFERENTIAL DIAGNOSIS

<i>Nature of Discharge.</i>	<i>What is felt by Vaginal Examination.</i>
Abortion. Bits of ovum may be found. When put in water chorionic villi float out like seaweed and are pathognomonic.	A patulous os and dilated cervix, unless the case is one of cervical abortion. Size of uterus corresponds to history.
Extra-uterine pregnancy. A decidual cast of the uterus may be found. Or fragments of decidua without any foetal membrane are found.	Before rupture a tender, egg-shaped tumour is felt either behind or to the side of the uterus.
Vesicular mole. In the discharge may be found the white currants embedded in red jelly. The discharge is watery and blood-stained, but does not stiffen linen.	The uterus is usually larger than the period of pregnancy indicates. It is round and boggy.
Hydrorrhoea gravidarum. The discharge is watery, usually blood-stained, continuous, or in gushes, and stiffens linen.	Simply a pregnant uterus. The membranes are unruptured.
Polypus. The discharge is bloody.	The polypus is felt. It is seen through a speculum.
Carcinoma of the cervix. The discharge is bloody, watery, or purulent. If there is definite ulceration it may be foetid.	An indurated new growth or ulcer is felt on the cervix, which bleeds readily on examination or coitus. Through a speculum the cancer is seen.

ACCIDENTAL HAEMORRHAGE AND PLACENTA PRAEVIA

We have next to deal with separation of the placenta which causes bleeding in the last three lunar months of pregnancy. The child is now viable.

If bleeding occurs from separation of a normally situated placenta, the condition is called accidental haemorrhage; if from an abnormally situated placenta, it is called unavoidable haemorrhage, and the condition is known as placenta praevia.

What is a normally situated placenta? On examining frozen sections of a woman who has died in prolonged labour the uterus is seen to be divided into two well-marked parts, upper and lower, by a constriction which is known as the contraction ring, retraction ring, or Bandl's ring. The upper thickened contractile portion consists almost entirely of muscular tissue. The lower expansile portion is thin and fibrous, containing sparsely scattered muscular fibres. The longer the labour and the greater the obstruction the more extensive this part of the uterus becomes and the more drawn out its walls. Much controversy has centred on the origin of the lower uterine segment, as to whether it arises from the tissue immediately above the internal os or from the upper portion of the cervix just below the internal os. In the latter case Bandl's ring is considered to be the original internal os and Müller's ring, which is a constriction of the cervical canal situated below the internal os, forms the boundary between the lower uterine segment and the rest of the cervix. In the former case the internal os is the lower boundary of the lower uterine segment and the contraction ring is developed from the uterine wall.

If the placenta is situated above Bandl's ring it is normally situated. If it is inserted partially or wholly in the lower uterine segment it is called placenta praevia.

ACCIDENTAL HAEMORRHAGE

Causes. Any cause that leads to an unhealthy or diseased decidua may cause an unhealthy or diseased attachment of the placenta. Hence endometritis, Bright's disease, disease of the arteries or blood, debauchery, drunkenness, all render

a pregnant woman more liable to premature separation of the ovum, leading to abortion, miscarriage, or accidental haemorrhage. A fall or similar accident may be the determining cause, but disease of the uterus is always the predisposing cause. Healthy pregnant women have sustained very severe injuries without separation of the placenta.

Danger to the patient. The occurrence of severe accidental haemorrhage is one of grave danger to the patient. In our experience it is, next to sepsis, the greatest risk a pregnant woman runs. If she is in labour when the haemorrhage comes on, the danger is greatly decreased.

Two kinds of accidental haemorrhage. Accidental haemorrhage is divided into concealed and revealed. In the first the blood is retained in the uterus, in the second it escapes at the vulva. The first is very rare and exceedingly fatal. Often some blood runs out from the vulva and some is retained in the uterus.

Concealed accidental haemorrhage.

Definition. Concealed accidental haemorrhage may be defined as an accidental haemorrhage, which leads to sufficient loss of blood to cause constitutional symptoms without any blood issuing at the vulva.

Reason why the blood does not escape. There are four reasons usually assigned for concealment of accidental haemorrhage. ① The blood may be retained behind the placenta, owing to the firm adhesion of the placental margin. ② It may burst through the membranes and surround the foetus, or the fixation of the presenting part in the lower uterine segment may prevent its escape. Possibly, too, the blood may be effused between the uterine wall and the foetal membranes, and be retained by the firm adhesion of the membranes to the internal os. But what is actually found in concealed accidental haemorrhage is that the uterine muscle is enfeebled and made flabby by its degeneration from disease. As the blood is poured out this muscle readily yields, and so more blood is lost. If the uterine muscle is comparatively healthy it does not yield,

and consequently the blood either escapes at the vulva or the bleeding ceases. It is this degenerate condition of the uterine muscle that makes concealed accidental haemorrhage so excessively fatal. There is no hope that the bleeding will stop unless the uterus has tone and can retract, and it is this very loss of tone, and nothing else, that leads to the haemorrhage being concealed.

Symptoms and signs. Owing to the fact that the patient does not see any blood, symptoms and signs are as a rule well advanced by the time she comes under observation. She has all the symptoms of haemorrhage and the shock due to dilatation of the uterus is added to that caused by the loss of blood. She is very white, collapsed, thirsty, anxious, and restless, with a small and rapid, possibly even an imperceptible pulse. Distension of the uterus causes severe abdominal pain. She may say that her stomach has become bigger in the last few hours. By palpation the uterus is found to be large, round, tense, and tender.

Treatment of concealed accidental haemorrhage. Concealed accidental haemorrhage is such a rare occurrence, as well as such a desperate condition, that the results of our present treatment are uncertain. As the loss of muscular tone is the cause of danger and the stretching of the uterus still further impairs the already feeble muscle, rupture of the membranes to allow of exit of the blood, followed by plugging of the vagina, as described under revealed haemorrhage, may be tried, for we are convinced that plugging properly done can stop haemorrhage whether the membranes are or are not ruptured. Infundibular extract is said to cause powerful contractions in an atonic uterus. It should certainly be employed in these cases.

To rupture the membranes. Put the patient in the cross-bed position, douche the vagina, put a bullet forceps on the anterior lip of the cervix and pull it down. While the cervix is thus pulled on the haemorrhage ceases. Guide with your finger a sterile catheter stylet through the cervix and rupture the membranes. When the blood has escaped, again give a hot vaginal douche, and plug the vagina (*see p. 129*); inject $\frac{1}{50}$ of a grain of ergotine citrate or 1 c.c. of

infundibular extract deeply into the buttocks, and treat the patient for collapse.

As an alternative empty the uterus by vaginal Caesarean section. Though coeliotomy with Caesarean section or hysterectomy have been successful, they would fail in the worst cases and we do not recommend them.

How to perform vaginal Caesarean section. The patient lies in the cross-bed position under an anaesthetic. Douche the vagina and empty the bladder.

Put in a large posterior speculum. Put bullet forceps on either side of the os and get your assistant to draw the cervix down. Make a transverse incision through the cervical mucous membrane below the bladder. Take blunt-pointed scissors and insert one blade into the cervical canal and one into the transverse incision, cut upwards to or beyond the internal os. The bladder retracts upwards before the scissors as the assistant pulls the cervix down. The general abdominal cavity should not be opened. Much greater room will be obtained by splitting the posterior lip as well. Put your hand through this incision into the uterus, catch a leg of the child and extract it. Manually remove the afterbirth and douche out the uterus with a hot douche to stop the bleeding. Reinsert the posterior speculum and pull down the cervix with bullet forceps. Sew up the cut in the cervix with catgut. Again douche the uterus and plug with iodoform gauze.

Revealed accidental haemorrhage.

When the blood escapes from the vulva, the diagnosis lies between revealed accidental haemorrhage and placenta praevia.

Diagnosis between revealed accidental haemorrhage and placenta praevia. This is simple. When there is haemorrhage the internal os is nearly always patent enough to admit two fingers. Make a vaginal examination, with the usual precautions. It is better to try and get the half hand into the vagina, for there may be some difficulty in reaching the os with only two fingers. Pass one finger into the os. In placenta praevia the thick spongy substance of the placenta

is felt directly over or to one side of the internal os. It is distinguished from blood clot by the ease with which the latter can be broken up by pressure with the finger. If the placenta cannot be felt, treat the case as one of accidental haemorrhage.

Danger of revealed accidental haemorrhage. The amount of blood lost may be slight and, unlike placenta praevia, there is no inherent necessity for the bleeding to be repeated. But revealed accidental haemorrhage is, as a rule, a very serious condition. During the last seven years at the Rotunda we have had forty-six intern cases. Twenty-one were severe cases treated by plugging. There was one death. We are accustomed to divide the cases into those with labour pains and those without labour pains. In the first the outlook for the mother is favourable, especially when labour is already well advanced, with strong pains, when haemorrhage begins; but when bleeding occurs without labour pains, and is severe, the patient's life is in the gravest peril.

Treatment for revealed accidental haemorrhage. Treatment resolves itself into (1) stopping the bleeding, (2) the treatment of collapse.

Methods of stopping the bleeding. So many methods have been devised to stop the bleeding that probably none are wholly satisfactory. The principal methods that have been advised are—

1. *Rupture of the membranes.* The disadvantage of this is that labour may not set in for many hours; and when it does, its advance is likely to be slow. It is apparent, therefore, that death may occur before its onset.

2. *Rapid delivery.* The os is dilated by the hand, by Frommer's dilator, or by cervical incision, and both child and placenta quickly delivered. In carrying out these manipulations the patient is subjected to considerable shock, and experience has proved that this extra shock has frequently been the cause of death.

3. *Bipolar version.* Version, which is a most valuable treatment in placenta praevia by causing pressure of the foetal half-breech on the bleeding points, fails to arrest the bleeding in accidental haemorrhage.

4. *Caesarean* section has been adopted by some authorities. The shock accompanying the preparations for and performance of *Caesarean* section as at present conducted makes this operation quite unjustifiable in our opinion. Cases that are saved by it, we believe, would run less risk from treatment by other methods at our disposal.

Rotunda treatment. In the face of these difficulties have we any better treatment to offer? We claim that we have. The treatment by plugging the vagina, reintroduced by Sir William Smyly during his Mastership of the Rotunda, has met with far greater success than any other form of treatment. This treatment has been followed out since that date, and succeeding Masters have endorsed his good opinion of it. It is upon personal experience that we recommend it. It falls to the lot of the Master of the Rotunda Hospital to see so many cases of different severity that he learns to estimate with considerable accuracy the effect of different forms of treatment. We would insist that statistics of accidental haemorrhage as a whole are misleading, for the diagnosis is so much subject to the influence of the personal equation of the observer, that a small haemorrhage, which with one man will be entirely ignored, will with another be classified as a case of accidental haemorrhage and add to the good results of any particular treatment.

Plugging the vagina. In the great majority of cases haemorrhage occurs before the os is sufficiently dilated to permit rapid delivery of the child. In such cases we advise plugging the vagina. If the haemorrhage is likely to bring about constitutional symptoms, or if for any reason you have to leave the patient, the only time in such cases when plugging is not indicated is when the os is fully dilated and rapid delivery feasible.

Some say that plugging is contra-indicated when the membranes have ruptured. This is because they think plugging stops the haemorrhage by raising the internal pressure, and therefore more blood must be poured out into the uterus to take the place of the escaped liquor amnii, in order that the same intra-uterine pressure may be obtained. From practical experience we have found

plugging as efficient after as before rupture of the membranes.

If the vagina is plugged properly, especially in relation to the cervix, we are confident that bleeding will cease, and you will be able to devote your time to restoring the patient from collapse. There is, however, one word of warning needed, namely, that vaginal plugging causes shock and the patient will not respond to attempts to restore her, as well as you might wish, until the plug is removed. If the plug is not rightly and tightly inserted, it does no good, and the sign of this will be that blood will ooze through it. If this occurs, take it out and replug.

How to plug the vagina. Pledgets of wool about the size of the closed thumb are boiled in a saucepan, and lysol added to make a solution of half an ounce to the gallon. The lysol acts as a lubricant. We carry a jar of prepared and sterile plugs, which are put into a scrubbed and scalded basin with a half an ounce to the gallon solution of lysol. If you have no wool and the case is urgent, strips of linen or torn handkerchiefs will do. A large number of pledgets will be needed, for the vagina is very capacious.

The woman lies in the left lateral position, with her hips projecting over the edge of the bed. Carefully cleanse your hands, the external genitals, the muco-cutaneous surfaces of the labia minora, and douche the vagina in the manner described under 'Abortion' (p. 94). Pass a catheter. Insert the left half-hand, with the palm towards the rectum, into the vagina, and using it as a posterior speculum, both pull back the perineum and open the orifice of the vagina with it. The finger tips of the left hand reach up to the posterior fornix and are able to hold the first plugs in position. Keep the basin with the pledgets of wool on a chair at the right hand. Take one pledget, squeeze it dry and push it with the fingers of the right hand well home into the posterior fornix. Take another, squeeze it and push it into one lateral fornix, a third into the other lateral fornix, and a fourth into the anterior fornix. If there is any space between these pledgets, push more in one by one until the cervix is firmly and securely ringed

by pledgets. This ring round the cervix is the foundation of the vaginal plug. If it is not firm the plug is useless. It is the foremost part of the ram, the action of which will be explained when the action of the plug is considered. Fill the vagina from above downwards with more squeezed pledgets, tucking an extra pledget in wherever space can be made for it. The stretched vagina is of far greater capacity

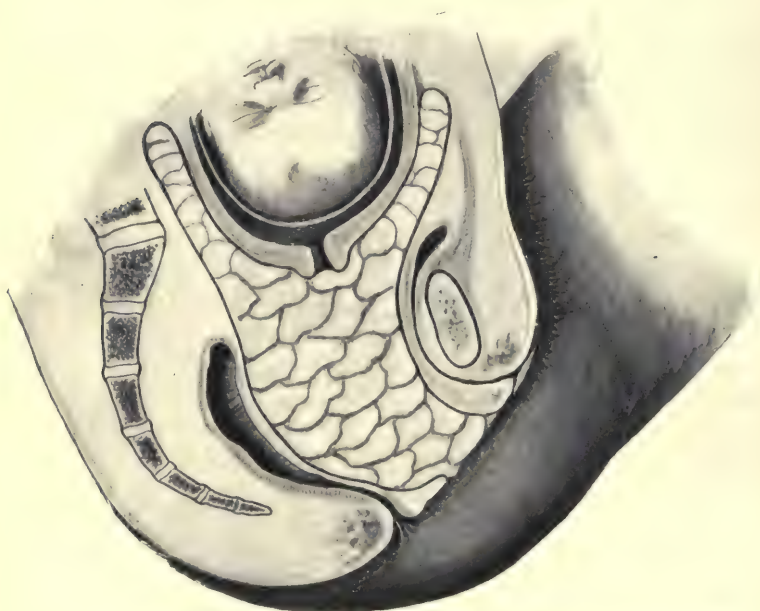


FIG. 55. The vagina plugged. Note the fornices pushed up by the plugs.

than one would think, but eventually it will be filled to the orifice of the urethra. Put a pad of scorched gamgee tissue over the orifice of the vulva, and keep the plug in its place by a firm T bandage with the tail-piece passed between the patient's legs. Then put on a tight binder. Stand on the left side of the patient and pin the binder from above down, inserting the pins transversely with the points buried.

How the vaginal plug stops the bleeding. Some have

held that the bleeding is stopped by increased intra-uterine pressure, and that blood cannot be poured out into a uterus squeezed between a tight binder and a vaginal plug. Others think that the pressure of the plug irritates the cervical ganglia and so excites contraction of the uterus. We think that both these explanations are sound. In addition to these causes, we hold that the plug directly kinks and presses on the uterine vessels. The uterine vessels reach the side of the uterus at the level of the internal os. Before they enter the uterus, arterial and venous branches are given to the cervix. We believe that we first fix the cervix with the surrounding plugs and then drive the pledgets in the lateral fornices like a ram into this angle against the uterine vessels. Whether this explanation is right or wrong, we are sure that the efficiency of the plug depends on the efficiency with which we ram the cervical ring of pledgets up towards the uterine artery. The hard plugs can actually be felt from the abdomen, reaching up well above Poupart's ligament. The objection has been raised to this that blood would still flow through the ovarian vessels which are out of reach of the vaginal plug. The same objection holds good in respect to stopping post-partum haemorrhage by pressure on the aorta, yet we know that this is effectual. There are many good reasons to advance in favour of the uterine vessels being the channels concerned in accidental haemorrhage.

Treatment of collapse. Having stopped the haemorrhage by the plug, if the patient is collapsed treat her for it. As we have said, the plug in the vagina is apt to cause shock, and, despite the cessation of bleeding, render treatment for the time less successful than could be wished. First put her on her back in bed and give her an injection of morphia gr. $\frac{1}{2}$ with atropine gr. $\frac{1}{100}$. This will save her from the pain the plug causes and the added shock due to the pain.

Order of treatment.

1. The bleeding, the cause of the collapse, has been stopped by the vaginal plug.

2. If the patient's condition is very bad, rally her temporarily by injecting hypodermically first a syringe

full of ether, then one of brandy, and lastly, gr. $\frac{1}{20}$ of strychnine, in the hope that first the rapidly absorbable ether will restore her, that the more slowly absorbed brandy will take its place, and that finally the strychnine, with its more lasting effect, will take command. Also give infundibular extract (1 c.c.) intramuscularly, or ernutin (1 c.c.) intravenously. Do not give anything by the mouth, for she will not retain it.

3. Raise the lower end of the bed, so that the blood tends to run to the vital centres of the brain. Don't waste time looking for suitable blocks. A box or a chair answers very well.

4. Infuse two pints of normal saline (3j to Oj) at about 110°–115° F. either into the median cephalic or median basilic vein at the bend of the elbow, or a pint under each breast. The choice depends on the urgency of the case. If the case is urgent, inject into the vein; if it is not so urgent, inject under the breasts.

Venous infusion. If possible, use water that has been boiled, and tabloids for normal saline. But if not, use ordinary tap water, warmed by the addition of water from the kettle, and ordinary table salt, sterilizing the salt by boiling in a little water. There is not time to wait whilst a quantity of boiled water cools. A scalpel, probe, and infusion apparatus will be needed. There is no need for an anaesthetic, as the patient is too ill to mind pain. Bare one arm and tie a bandage round the middle of the arm to compress the superficial veins but not the brachial artery. This makes the median basilic and median cephalic veins stand out just at the bend of the elbow. The median basilic is the larger vein, but the brachial artery lies directly under it, therefore the median cephalic is safer. We always choose the larger median basilic. Expose it by cutting along the skin over it for about an inch. Put the probe under it and move the probe up and down, so as to free the vein. Pass a piece of fine silk underneath it. Fill the infusion apparatus with saline, holding the needle up to expel all air. Kink the tube to stop the flow. Cut through the anterior wall of the vein

with the knife and insert the needle. You can tell if it is in the lumen of the vein and not between the coats of the vein wall by the ease with which the needle slips in. Tie the needle in with the silk thread. Cut the bandage round the arm, and holding the funnel of the infusion apparatus about two feet above the patient's arm, let the fluid slowly run in, allowing about fifteen to twenty minutes for the two pints to enter the circulation.

Take out the needle or cannula, tie the vein above and below the wound in it with fine silk, cut these ligatures short and sew up the skin with salmon gut. Any temporary dressing, such as a clean handkerchief tied round the elbow, will do until proper dressings are obtained.

Infusion into the breasts. Wash the skin at the lower edge of the breasts with soap and water. Fill the infusion apparatus with fluid. Pick up the breast with the hand and plunge the needle deeply into the tissues under the breast. If you have an infusion apparatus with double tubes and needles infuse under both breasts at the same time. Infuse one pint under each breast. The fluid takes longer to be absorbed than by venous infusion. Cover the puncture wounds with plaster. Massage the breasts gently to hasten absorption. The disadvantages of infusion of the breast are, that the fluid does not go directly into the circulation and that death has occurred from infection, usually by the *bacillus aerogenes capsulatis* causing malignant oedema.

5. After infusion, inject a pint of strong coffee into the rectum.

6. Finally, if the patient's condition is desperate, resort to artificial respiration and oxygen inhalation. The benefit resulting from artificial respiration is probably due to the heart massage it causes.

Infundibular extract raises the blood pressure and keeps it raised for some hours. In profound shock it is of great value, particularly when used in conjunction with saline infusion. Ernutin, when injected intravenously, also raises blood pressure and acts as a stimulant, but is said to be less efficient than infundibulin.

In addition, open the windows, and throughout all this procedure keep the patient warm with hot bottles (wrapped in flannel) and with blankets. Keeping the patient warm is indeed the most important part of the treatment.



FIG. 56. Infusion of breasts.

Recurrence of symptoms. The pulse always improves after venous infusion, but it may quickly flag again. When it begins to flag, it is a warning that secondary collapse is going to supervene. Therefore infuse two more pints into the same vein above the top ligature or into the median basilic of the other side, or infuse into the breasts, and repeat the infundibular extract. This may be necessary within half an hour of the first infusion. Give another

injection of strychnine gr. $\frac{1}{20}$ and plenty of ether hypodermically. Sit by the bedside of the patient and watch her carefully. You may have to treat a third occurrence of collapse, but prepare against this by injecting a pint of hot saline high up into the rectum half an hour after the second infusion. It is better not to leave the patient until labour has finished and all fear of post-partum haemorrhage passed, if she has had dangerous collapse.

When to take out the plug. We advise removal of the plug within six hours and consider this too long if it causes much shock. When the plug is removed the os may be the same size as when plugged. But when the cervical ring of pledgets is taken away, the os may widen to full dilatation. The contractions of the uterus that have led to this dilatation are painless, possibly because the plug presses on and paralyses the cervical nerve ganglia. The fact of this dilatation points to considerable uterine stress, and shows that the plug has been in as long as is compatible with safety.

If the os is not sufficiently dilated for the delivery of the child, watch by the bedside of the patient. If more bleeding occurs, replug.

Labour is often very rapid, easy and painless. The cervix and its ganglia are probably paralysed by pressure, with complete paresis of the circular fibres, and the vagina has been enormously distended by the plug. If the child is not delivered quickly and the os is sufficiently open deliver by forceps or by bringing down the legs, as the case may be.

Be prepared for post-partum haemorrhage. The patient is enfeebled by the loss of blood and post-partum haemorrhage is very likely to occur. A little post-partum bleeding may lead to dangerous results, when following ante-partum bleeding. Therefore do not wait long for the placenta, if any haemorrhage occurs between the delivery of the child and that of the placenta. Express it or remove it by the hand and give a hot intra-uterine douche. Lastly, remember that the vaginal plug macerates the vaginal epithelium and bleeding makes the patient weak. Hence she is rendered more liable to puerperal sepsis.

PLACENTA PRAEVIA

Bleeding in the last three lunar months of pregnancy, that is caused by the separation of a placenta situated either wholly or in part in the lower uterine segment, is known as unavoidable haemorrhage, and the placenta is termed a placenta praevia. A placenta praevia is very often large and thin—placenta membranacea. Sometimes part of it covers the internal os, when it is closed, in which case it is known as a central placenta praevia; or the edge of the placenta reaches the margin of the internal os, marginal placenta praevia; or the edge may be felt by passing the fingers, during a vaginal examination, through the internal os, lateral placenta praevia. If the placenta is not felt by vaginal examination, it is clinically a case of accidental haemorrhage.

Frequency. We have had forty-one cases in hospital in the last seven years with one death from haemorrhage and one from sepsis (4.87 per cent.).

Causation of placenta praevia. Placenta praevia has been proved to occur in the following manner, viz. the placenta is formed not only from the chorionic villi attached to the decidua serotina but also from those that grow beneath the decidua reflexa. It has been suggested that the cause of this growth is difficulty in the nourishment of the ovum, the result of diseased decidua.

Why does a placenta praevia become partly detached in the last three lunar months of pregnancy? The placenta being attached to decidua, which does not normally join with the placenta, the attachment is not firm but is easily separated. The lower uterine segment expands in the later months of pregnancy, in preparation for labour, and the placenta does not expand with it, and therefore becomes detached.

Danger of placenta praevia. Out of forty-one cases of placenta praevia in the hospital in the last seven years, there have been two deaths. Of the forty-one children twenty-four were born dead. Statistics such as these do not represent the condition as one might expect to find it in private prac-

tice, for many of our cases are desperately ill when admitted. The same risk of sepsis that follows accidental haemorrhage, namely, decreased resistance from loss of blood and infection from manipulations, adds to the danger. The low situation of the placenta is also said to increase the danger of sepsis, offering a lower area than normal of blood clot (in the mouths of maternal sinuses) upon which bacteria can thrive. Another danger to which a woman with placenta praevia is exposed, is that due to a tear of the cervix extending to the uterine artery. This tear is very liable to occur because of the destructive influence of the placenta situated in this region. The erosion is due to the fact that the decidua, being badly developed, offers less resistance to the encroachment of the trophoblast, which will be found in many instances to have eaten almost through the uterine wall.

Signs and symptoms. The first sign of placenta praevia is external haemorrhage. The bleeding may occur during sleep. There is no pain, for the contractions of the uterus during pregnancy are not painful; hence the patient may not even wake up. The bleeding may be slight or it may be fatal before you can get to the house. Of one thing be sure, that if slight bleeding occurs, and this bleeding is due to placenta praevia, the bleeding will recur, and probably in so severe a form that it may be fatal.

As the placenta occupies the lower uterine segment, the head of the child will not be fixed, but will be freely movable. For the same reason malpresentations are common.

Diagnosis. Placenta praevia is diagnosed by making a vaginal examination and feeling the placenta either through or lying over the internal os. By abdominal palpation the freely ballotting head or malpresentation with haemorrhage attract attention, but the diagnosis is made by vaginal examination. Therefore cleanse the external genitals and your hand carefully, and insert two fingers or half a hand, into the vagina. One finger can always be passed through the internal os. If the placenta is central a spongy, thick substance is felt between the finger and presenting part, and if this is separated a little, there is bleeding.

If the placenta is marginal or lateral you feel its edge. Distinguish it from blood clot, because it does not break up by pressure with the finger. Other signs given are filling in of one lateral fornix, increased pulsation or a boggy feeling in the fornices, but do not rely on these. If the placenta is felt we diagnose it as placenta praevia. If it is not felt, we treat the case as one of revealed accidental haemorrhage. If, when the os has opened after vaginal plugging for accidental haemorrhage, but is not sufficiently open to allow of immediate delivery, we feel the placental edge in advance of the presenting part, we treat as in placenta praevia, namely, by turning.

Treatment of placenta praevia. If the os were not sufficiently open to permit of two fingers being passed through the internal os, we would plug the vagina and put on a tight binder as in revealed accidental haemorrhage. We have never met such a case and are doubtful that cases of placenta praevia with haemorrhage ever do occur where the os cannot easily and safely be made to open sufficiently to admit two fingers.

We are never satisfied with merely rupturing the membranes, although this sometimes stops the bleeding. The probable explanation of this is that rupturing the membranes converts the pains from those that stretch the lower uterine segment to those that press the child down.

If the internal os admits two fingers, we perform a bipolar version.

If it admits the hand, we perform internal version.

If the os is fully dilated, we deliver the child rapidly and remove the placenta manually if haemorrhage continues.

How to perform bipolar version. Bipolar version was first described by Braxton Hicks. To do it the internal os must be large enough to admit two fingers, and where there has been a smart haemorrhage due to placenta praevia, the os is always large enough to admit two fingers.

Put the patient in the cross-bed position. Give an anaesthetic. It is not always necessary, but makes the operation much easier, for if conscious the patient will resist and make her abdomen hard. Make an abdominal palpation

to ascertain the lie of the child. Sometimes the bleeding is so severe that there is not time to give an anaesthetic or to palpate. Wash the external genitals, pass a catheter, douche the vagina, and wear gloves. Pass your whole hand into the vagina. Rupture the membranes. The object is to get one foot over the internal os. If the child presents by the breech this is easy. If the child lies transversely it is as a rule easy to pass two fingers up to the foot.

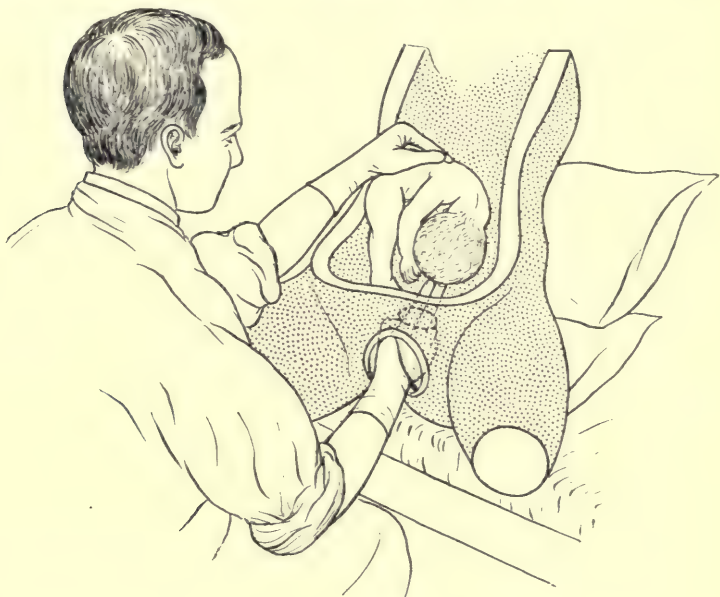


FIG. 57. Bipolar version.

If the head presents, find out to which side the back is lying. It is necessary to make the child's lie a true transverse with the limbs downwards. With the whole hand in the vagina, two fingers through the internal os, pushed through the placenta if it is central, rupture the membranes, if necessary, with a stylet. In central placenta praevia make as little laceration as possible in the placenta in the interest of the child. If you picture to your mind a child presenting with its head down, you will see that, if the head is pushed towards its back and the child turned

the limbs will be directed downwards, whereas if the child's head is pushed in the direction of its abdomen, to turn, the limbs are directed upwards away from the internal os. Therefore it is essential before performing bipolar version to be sure to which side the back of the child is directed. Next, whether the head is central in position or in the left iliac fossa or the right iliac fossa, push it with two fingers in the direction of the back. Suppose, for example, the head lies in the left iliac fossa, but the back is directed to the mother's right side. With two fingers in the uterus direct the head with a series of pushes or pulls, until it lies over the os internum. At the same time with a hand on the fundus, press the child's breech over to the mother's left side. Then with a series of pushes direct the child's head up into the right iliac fossa and with the abdominal hand press the child's breech to the left and downwards. The child is now lying transversely, with its head in the mother's right loin, the breech in her left loin, and the face, limbs, and abdomen looking downwards. Continue to keep pressure on the breech pressing it down towards the internal os, now feel for a knee and follow the leg down to the foot. Either foot will do.

It is necessary to know how to distinguish the foetal parts.

To recognize the knee from the elbow. The distinctive point is the tuberosity of the tibia, which is not hard to feel. It is useful practice for these distinctions to carefully finger these points in the new-born child, so that you may become familiar with their outline.

To recognize the shoulder. The acromion process, the ribs, and the spine of the scapula are the landmarks.

To recognize a foot from the hand. The straight row of the toes of the foot as opposed to the separate thumb of the hand is not difficult to make out. Again, the heel and the ankle are quite distinctive. Also a thumb can be folded across the palm of the hand, and a great toe cannot be folded across the sole of the foot.

Pulling the foot through the cervix.

The foot cannot safely be pulled down through the in-

ternal os with two fingers when the os only just admits two fingers. To force a third finger through, so as to catch the foot more firmly, is to endanger the life of the patient. The lower uterine segment is made sodden and eroded by the insertion of the placenta and will tear like wet blotting-paper. The tear runs up into the body of the uterus across the uterine artery and leads to terrible haemorrhage. This is a very real danger, and we warn you never to attempt to force the internal os open in placenta praevia.

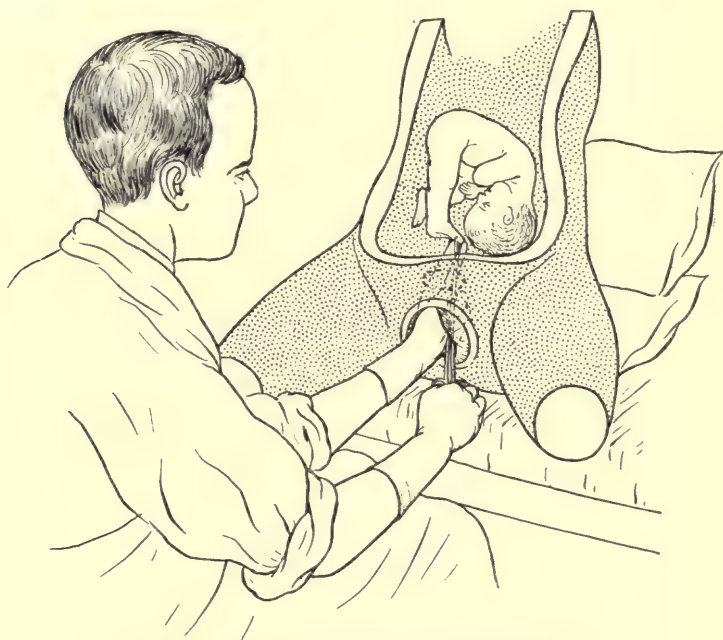


FIG. 58. Catching the foot with bullet forceps.

How then is the foot to be pulled through? Take a bullet forceps, and guiding it with the fingers catch the foot. Remove the fingers and pull the foot through the cervical canal. A bullet forceps on the child's foot never does any harm. Sometimes you can point the toes and guide the foot over the internal os with the two fingers and press it through the cervical canal by abdominal pressure on the breech, and this plan may be tried before the bullet forceps. If a hand is

pulled down by mistake, tie a long piece of iodoform gauze round the wrist and push the hand back. Pulling on the gauze when the child is being born will prevent extension of the arm. When the foot is in the vagina tie a piece of gauze round the ankle and let the end of the piece of gauze hang out of the vulva.



FIG. 59. The foetus turned in placenta praevia.

All danger of further haemorrhage is now past. The half breech presses on the placenta and compresses the bleeding points. If there is any bleeding, pulling on the piece of gauze will at once stop it. If the patient is not collapsed leave her in the hands of the nurse, telling her to pull on the gauze, if there is any bleeding. Labour may not set in strongly for two days. The child is probably dead, but the immediate danger to the mother is past.

Be at hand when labour sets in and the leg is pushed down by the pains, for post-partum haemorrhage is likely to occur.

Internal version. For internal version the whole hand must be passed into the uterus. The preparations are the same as for bipolar version. First ascertain by abdominal palpation to which side the foetal limbs are directed. If the limbs are to the right, use the left hand; if to the left, use the right hand. With the hand in the uterus feel for and grasp a foot and pull it down. The head may have to be pushed away towards the back before the foot is felt. The child turns quite easily of itself, when the foot is pulled down. Tie a strip of gauze round the ankle and leave one end hanging out of the vulva. In performing a difficult internal version an assistant should pull up the head with both hands, using considerable force if necessary.

Sometimes, when the leg is pulled, the child will not

rotate. In such a case, whilst putting traction on the leg, get the nurse to raise the head up towards the fundus with

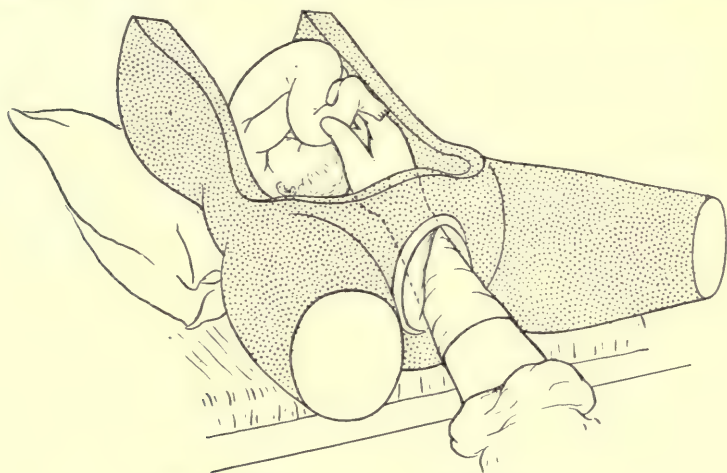


FIG. 60. Internal version. Catching the foot.

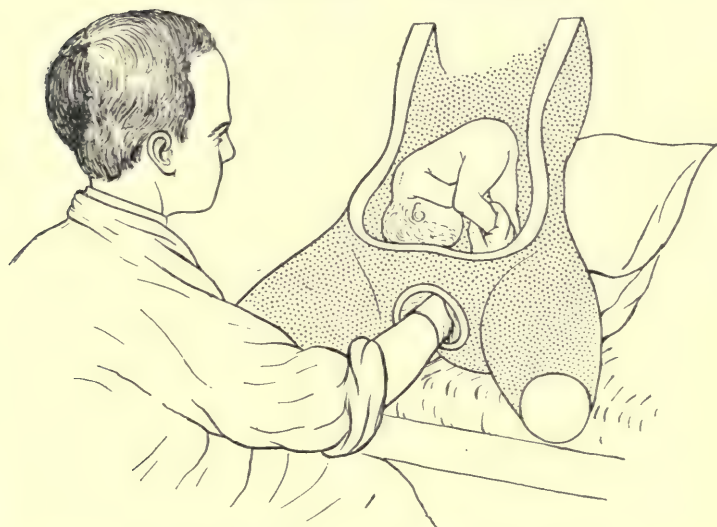


FIG. 61. Internal version. Bringing down the foot.

her hands on the abdomen, or tie iodoform gauze to the foot and pull on that, and with your other hand in the vagina or uterus push the head up towards the fundus. It

is sometimes extremely difficult to pass a loop of gauze around a foot that has not come low down into the vagina. This can usually be overcome by pulling with considerable force, but occasionally an assistant is required to pass the loop.

Labour is probably in progress, if the os is big enough to admit the hand. It is better in this case to wait for an hour to see how labour progresses, and then decide whether to stay or to leave. In nearly all cases it is better to stay.

Once more, remember the risk of post-partum haemorrhage. The placental site, being in the lower uterine segment, contracts and retracts badly. As the low implantation of the placenta, the loss of blood, and the manipulations all predispose to sepsis, we give a hot intra-uterine douche after the delivery of the placenta.

Champetier de Ribes' bag. Treatment of placenta praevia by turning has not met with universal acceptance, the chief objections to it being that the infant mortality is so great. The rival treatment is the use of Champetier de Ribes' bag. This is a pear-shaped bag, which can be boiled and passed by a special pair of forceps through an os that will admit two fingers. It is then filled with water by a syringe. When the bag is in position, the control of haemorrhage is complete. It presses on the placenta in the same way as the half breech. Some operators tie a weight of two pounds to the tube of the bag and hang the weight over a pulley or the foot of the bed to keep up pressure. The advantages of the bag are said to be that no more mothers and fewer children die than when treated by version. Statistics quoted to prove this are open to grave objections. The disadvantages are that in general practice placenta praevia is rare, and when the bag is wanted it may leak or be too sticky for insertion. Champetier de Ribes' bags and all other rubber material can be preserved indefinitely if continuously exposed to the vapour of kerosene. If the oil itself is permitted to touch the rubber, disintegration rapidly follows. It is also stated that rubber can be preserved in glycerine. We seldom use the bag at the Rotunda Hospital, but we are by no means opposed to its use.

CHAPTER VII

ABNORMALITIES DUE TO THE TOXAEMIA OF PREGNANCY

Headache—Pernicious Vomiting—Albuminuria—Eclampsia —Hydraemia

TOXAEMIA OF PREGNANCY

THERE can be no doubt of the fact that a pregnant woman is much more liable to be affected by toxæmia than a non-pregnant woman. Although the definite causes of this toxæmia have not been ascertained, and we are, in fact, very ignorant of the etiology of the toxæmias of pregnancy, yet it seems reasonable to regard the increased metabolism of the pregnant woman as one of the chief causes of the toxæmia. Until its birth the foetus is a parasite upon the mother, and adds its demands for nutrition and the need of the elimination of its waste products to the normal economy of her body. Owing to its presence the mother is compelled to eat more than is her wont, and the food she takes is, as a rule, largely of a nitrogenous character.

In the control of the metabolism of the body, the liver is the important agent, and in the elimination of waste products the bowels and the kidneys. Hence any defect of the liver or kidneys, or any sluggishness of the bowels, will tend to subject the pregnant woman, with her greater metabolism, to the danger of deficient control of the products on the part of the liver, or deficient elimination on the part of the bowels or kidneys.

One is not, therefore, surprised to find an hereditary tendency to the toxæmia of pregnancy, that the toxæmia is associated in its severest forms with pathological changes in the liver and kidneys, and that constipation is practically a constant accompaniment.

As further evidence of the toxæmia of pregnancy being due to stored metabolic products is the effect of treatment. By decreasing the metabolism of the patient, by diminishing her solid and especially her nitrogenous food, and by increasing her eliminative powers by means of purges and large draughts of water, the severer forms of toxæmia can be mitigated and the minor forms can be cured.

As regards its general character, the toxæmia of pregnancy does not differ either in its minor or major manifestations from other well-known forms of toxæmia. Thus headache, cramps, metallic taste in the mouth, vertigo, lethargy, pruritus, loss of appetite, nausea, flashes of light before the eyes, tremors, loss of memory, irritability, insomnia, or melancholy, are all common manifestations and warning symptoms of the toxæmia of pregnancy and the toxæmias that occur in yellow fever, uræmia, diabetes, and phosphorus poisoning. In the more severe symptoms a similar resemblance is found. Thus convulsions, severe or black vomit, delirium, and coma, are common to many toxæmias besides that of pregnancy.

Furthermore, pathologically, these toxæmias show similarity to one another. Thus the liver is always affected. Acute hepatitis with cloudy swelling, granular degeneration or necrosis is found. The kidney is acutely congested or inflamed in many cases, and closely resembles the kidney of scarlatina. The spleen, brain, blood, and other organs, are affected in varying degree.

The alkalinity of the blood in the toxæmia of pregnancy is also diminished, and the nitrogen excreted from the body shows increased ammonia and decreased urea coefficients. The toxæmia of pregnancy thus becomes allied to the 'acid intoxications' of pathologists, which occur in fever, diabetes, severe gastro intestinal diseases, acute yellow atrophy of the liver, severe anaemias, and other diseases. It is interesting to note that acute yellow atrophy and pernicious anaemia have been found by physicians to be relatively more common in pregnant than in non-pregnant women.

Hence it seems that the toxæmia of pregnancy is probably

not so much a separate entity as a condition produced by the change of balance of the metabolism of the body, which allies it to other toxæmias. But this statement must not be dogmatically interpreted, for as yet the nature of the toxin has eluded investigators, and though many theories have been brought forward, some of which will be noted under eclampsia, their failure to withstand tests and criticisms has served more to convince us of our ignorance than to further our knowledge, except in a negative sense.

What are the diseases of pregnancy which are due to toxæmia? Some diseases of pregnancy are undoubtedly due to toxæmia. Such are severe headache, pernicious vomiting, ascites, acute nephritis, and eclampsia. Hydræmia, though not proved to be due to toxæmia, will be included in this book under diseases of pregnancy due to toxæmia. All of these diseases have this in common, that a careful attention to the hygiene of pregnancy, to diet, to sleep, to exercise, and to the action of the bowels and kidneys, will either prevent them or certainly decrease the liability of the patient to them. With increased research the nature of the toxæmia of pregnancy is becoming better understood.

SEVERE HEADACHE

Persistent severe headache, especially if accompanied by insomnia, is a sign of toxæmia, unless due to some definite brain disease.

Treat it by decreasing the amount of nitrogenous food, by purging, by daily baths, by exercise, and by getting the patient to drink at least two pints of water a day.

HYPEREMESIS OR PERNICIOUS VOMITING

Definition. The ordinary morning sickness of pregnancy begins as a rule about the sixth week of pregnancy and ends commonly about the end of the fourth lunar month. However objectionable it may be to the patient, its important feature is that it does not injure her health. Vomiting may be more severe than this. It may occur at other times of the day. It may injure the patient's health. It may become

unconquerable and cause death. All vomiting that injures health, whether slightly or severely, is to be treated as pernicious vomiting.

Other causes of vomiting during pregnancy. The patient may have gastric ulcer or cancer of the stomach. She may have chronic dyspepsia, cirrhosis of the liver, or a tumour of the brain. She may be a chronic alcoholic. All these diseases cause vomiting. When pregnancy adds its tendency to produce vomiting to one of these diseases, pernicious vomiting may result. Therefore examine the patient carefully for any of these diseases.

Conditions sometimes associated with hyperemesis. Hysteria is sometimes associated with hyperemesis. Backward displacement of the uterus, erosion of the cervix, and too firm attachment of the membranes around the internal os are sometimes associated with hyperemesis. Therefore always examine for retroflexion of the uterus or erosion of the cervix. Replace the uterus and put in a Hodge's pessary. Treat the erosion by local applications. By curing these trifling complaints the hyperemesis may be stopped.

Signs and symptoms. Vomiting is the principal sign. At first it may not be more than the vomiting so often seen in the early months of pregnancy. But it is difficult to control, or begins to occur at other hours of the day than the hour of rising. Other signs of toxæmia accompany it, such as headache, constipation, insomnia, pruritus, irritability, or moroseness. The patient begins to lose flesh and strength. The vomiting becomes more persistent, causing great pain and occurring every time anything is introduced into the stomach, and finally becomes bile-stained or black vomit. The severer signs of toxæmia appear. The temperature rises, the pulse is feeble and rapid. The patient has intense thirst, her tongue becomes dry and brown, her teeth covered with sordes, her breath foetid, and she may have diarrhoea. Her urine is scanty, dark coloured, and contains albumen, acetone, diacetic acid, and perhaps blood. She becomes delirious, and eventually dies in coma.

Sometimes abortion occurs. Abortion may kill an ex-

hausted woman by the shock of labour or by puerperal sepsis. But if it does not kill her, her condition will probably greatly improve. The significance of these facts on treatment is clear.

Treatment. First exclude general diseases, the influence of a backward displacement of the uterus or eroded cervix. Put the patient to bed to decrease the metabolism of exercise.

If there is any sign that the vomiting results from hysteria keep the patient in bed in a darkened room, under the care of a special nurse, and away from all her friends, adopting the methods of the ordinary rest cure. Try also treatment by suggestion, such as the use of flying blisters, spraying the pit of the stomach with ether, and the use of the electric battery.

Treatment should next be directed to the elimination of toxins by the natural channels and to giving nourishment in a digestible form. Give a purge, so that her bowels are open at least three times in the twenty-four hours. The ordinary Mist. Alba repeated two-hourly may be tried, together with two blue pills. A drachm of Pulv. Jalapae Co. is a good purge, and may be repeated in six hours, or five to ten grains of calomel may be given in a small keratin capsule. Keratin is unaffected by the gastric juice, but is dissolved by the juices of the duodenum. If the purge is vomited open the bowels by means of enemas. Large soap and water enemas with two ounces of castor oil are suitable. If water is retained so much the better. Give her as much hot water as she will take. If she vomits give her two pints of saline through a soft catheter in the rectum, passing it as high up as possible.

Next attention should be directed to the treatment of vomiting and the giving of food. There is nothing better for severe vomiting than washing out the stomach with warm water and a little sodium bicarbonate through a soft siphon tube. The sodium bicarbonate loosens the viscid mucus that is secreted and clings to the walls of the stomach. Stop all food for twenty-four hours. Then try her cautiously with pepsencia whey, albumen water, and, at a later stage,

peptonized milk.¹ Administer the drugs commonly given for vomiting, such as Tr. Iodi. $\mathfrak{m}j$ every two hours, or a mixture containing bismuth and dilute hydrocyanic acid. Put a mustard plaster over the epigastrium. If vomiting persists, rest the stomach entirely for three or four days and feed by nutrient rectal enemata, washing out the rectum with a soap enema once a day. An enema of two eggs, one ounce of starch, fifteen grains of common salt, and four ounces of peptonized milk, may be given every six or eight hours.

Hyperemesis is said to arise also by too firm attachment of the membranes in the neighbourhood of the internal os. Disappearance of symptoms has followed dilatation of the cervix and separation of the membranes for a short distance around the internal os. Therefore in severe cases dilate the cervix with the index finger and separate the membranes.

If all these efforts fail to produce any good effect there is one measure that may relieve, namely, emptying the uterus. This will relieve her, provided the operation is not left until she is so weak that she will be killed by it. Therefore, if it is decided to induce abortion, it should be done before it is too late.

How to empty the uterus. The methods have been described under abortion (*see* p. 91). The method of choice is to dilate with sea-tangle tents for five or six hours, by which time you should be able to get a finger into the uterus. If the os is not large enough to permit of this, continue dilatation with Frommer's dilators or the fingers. It is best to try to complete the emptying of the uterus within eight hours, as delay is bad for the patient.

ALBUMINURIA

A woman with chronic nephritis may become pregnant; but we are now dealing with albuminuria that arises solely as a result of pregnancy.

Albuminuria seldom occurs before the seventh lunar

¹ **How to make pepsencia whey.** Take a pint of fresh milk, warm it to 100° F. Add a dessertspoonful of pepsencia. Leave for five minutes. Then break the curd up with a fork and strain the whey through muslin.

month of pregnancy. Albumen may be present either in small or large quantities. Its importance is that it is evidence of a toxæmic condition that may produce swelling of the legs, puffiness under the eyes, and swollen labia, that it is very likely to lead to intra-uterine death of the foetus or premature labour, and, lastly, that it may precede eclampsia. Like all other toxic diseases of pregnancy, it is more common in primigravidae than in multigravidae.

Treatment. In order to detect the presence of albumen in the urine, it is well to test it once a fortnight during the last four lunar months of pregnancy. If the case is slight, get the patient to have her bowels opened twice a day until the child is born. She should take a warm bath and drink two or more pints of water daily. Regulate the diet. Tell her to avoid meat and alcohol, and to take mainly milk, with milk puddings, bread and butter, and light farinaceous food. If the albumen decreases she may have fish and eggs, but she should keep on this light diet until ten days after the child is born, provided the albumen has then disappeared from a catheter specimen of urine. In a more severe case, with diminished urine, much albumen and oedema of the legs, order rest in bed, purgation, plenty of water, warm sponging night and morning, and milk diet only.

Once albumen has appeared in the urine, it may diminish with treatment, but it rarely disappears until the baby is born.

ECLAMPSIA

What is eclampsia? Eclampsia may be defined as the occurrence of fits in a pregnant woman, which would not have occurred had she not been pregnant. Hysterical fits and fits due to cerebral lesions are readily distinguished from eclampsia. Epilepsy is not so easily differentiated, and therefore, in describing the fits, we shall contrast them with epileptic fits. Uraemic fits, occurring in a pregnant woman, are indistinguishable from and may be classed as eclampsia.

When, during pregnancy, does eclampsia occur? It rarely occurs before the sixth lunar month of pregnancy. Its incidence becomes more frequent the nearer the time is to

full term. It may show itself for the first time five days after the delivery. The commonest period of its incidence is the last two or three months of pregnancy.

Danger of eclampsia. Eclampsia is always a grave disease, and is most serious when it occurs during labour. Puerperal eclampsia comes next in order of severity; eclampsia occurring without the onset of labour is the least dangerous. This is our experience at the Rotunda. General statistics show an average maternal mortality of between 20 and 30 per cent.

Notable facts connected with eclampsia.

1. Like other diseases due to toxæmia, it is more common in primigravidae.

2. It more often occurs with twin pregnancy.

3. It is apt to occur in this country when the weather becomes cold and damp. This is perhaps strange, for it is well known that eclampsia is more common in hot countries, possibly in relation to insufficient consumption of water. It seems to occur in epidemics, which suggests a microbic origin.

4. The death of the child in utero or its birth, as a rule but not invariably, greatly improves the condition of the mother.

5. Albuminuria is almost always a precursor of, and is always found subsequent to, a fit.

6. The greater the number of fits, the greater the danger to both mother and child.

7. Death of the mother may follow a few fits, and recovery may take place after more than thirty fits.

8. The kidney disease that is present in eclampsia subsides, and does not, as a rule, recur in subsequent pregnancies.

9. Rupturing the membranes occasionally causes improvement, due most likely to the loss of the liquor amnii.

Views of the pathology of eclampsia. The kidney is so frequently found diseased in post-mortem examinations of eclamptic patients that at one time eclampsia was regarded as identical with uræmia and consequent upon nephritis. But more careful investigation showed that the kidney changes might be so slight, and in some cases even absent, that the renal basis of eclampsia had to be given up.

More significant is the occurrence of haemorrhagic hepatitis, in which thromboses are found in the portal vessels surrounded by areas of necrotic liver cells. So constantly are these changes found in the liver cells that some observers consider them to be the primary lesion of the disease.

As regards the nature of the toxin, carbonic acid, lactic acid, micro-organisms of many kinds, portions of chorionic villi, and a poison contained in the placental cells, have all been held responsible, but none with evidence that has caused their general recognition. It has been suggested that the thyroid gland or the parathyroid bodies are deficient, for the normal hypertrophy of the thyroid gland has been noted as absent in cases of eclampsia, and the removal of the parathyroid bodies in pregnant animals (and also in non-pregnant animals) has been followed by convulsions.

The only change that seems to be constant, except the changes in the liver, is that the nitrogen excreted as urea is diminished, and as ammonia increased, a change shared by other forms of acid intoxications.

Warning signs and symptoms of eclampsia. The warning symptoms are those of toxæmia, such as headache, vertigo, flashes of light before the eyes, pruritus, drowsiness, irritability, insomnia, constipation, oedema of the legs, puffiness under the eyes, and albuminuria.

Significance of warning signs and symptoms. If a patient complains in the later months of pregnancy of any of the above signs and symptoms, examine her urine for albumen, and, if found, treat her as described under albuminuria. Eclampsia, a disease that has a mortality of between 20 and 30 per cent., may thus be warded off. The significance of warning signs and symptoms and the importance of their early recognition could scarcely be greater.

The eclamptic fit (contrasted with an epileptic fit). The eclamptic fit, like the epileptic, starts with an initial tonic convulsion. The patient, with or without an aura, suddenly becomes unconscious and stiff. If she is standing she falls heavily to the ground. She does not give the epileptic cry. All her muscles are stiff with tonic contraction. Her face is red and congested, her hands clenched, her jaw locked,

sometimes biting the tongue, her chest fixed, her arms flexed, and her back stiff but rarely arched. In all this the tonic stage resembles the tonic stage of an epileptic fit. The difference between the two lies in the duration of the tonic stage. In eclampsia this stage is so brief, that it may easily pass unnoticed, whereas in epilepsy it lasts several seconds and its characteristics are so definite that the impress of the several seconds of spasm is very marked upon the minds of bystanders. This difference of duration, and the history of previous fits, are the features that distinguish eclampsia from epilepsy.

The clonic stage of the two fits is indistinguishable. The clonic stage lasts from one to two minutes. The muscles that were stiff, twitch or jerk. The face twitches, the breath comes in fits and starts, the arms may be jerked violently, but the legs are rarely affected. The patient may die during this stage, or may sink into the last stage—coma. The muscles relax and the patient sinks into coma with heavy breathing. Consciousness, which is completely absent during the attack, is gradually restored, and the pupil reflex, which is also absent, returns, unless another seizure supervenes.

Events following the fit. The patient may pass from coma into a deep sleep, from which she awakes with a headache and mental confusion. She may have no more fits and recover; or, after an interval, she may again be convulsed and again recover. Sometimes she is maniacal for a varying time before complete recovery. On the other hand, she may never recover completely from a convulsion, but may again be convulsed before recovery, and the fits may recur in rapid succession. With increasing number of fits there is increasing peril to life. This is evidenced by deep and prolonged coma, rising temperature, and a rapid, low-tension pulse. Coarse rales are heard over the chest and are due to oedema of the lungs, which is a common precursor of death in this disease, as in acute nephritis, and severe toxæmias in general. Fits may be absent for many hours before death, but the coma remains profound, and the heart, overwhelmed by the poison, becomes weaker and weaker until it finally ceases to beat.

The temperature rises in eclampsia, but in hot countries convulsions accompanied by very high temperature may in reality be the result of heat stroke and not eclampsia. This should be particularly suspected if there is no albuminuria.

Frequently eclampsia leads to the onset of labour, or the onset of labour induces eclampsia. Therefore, in nearly all cases, the birth of the child should be expected.

Principles of treatment. Treatment is based on the following propositions:—

1. Prolonged labour is bad for the mother, and therefore, as soon as the os is sufficiently open, the child should be delivered artificially.

2. Eclampsia is an intoxication due to accumulated toxins produced by the increased metabolism of pregnancy or in some other at present unknown manner.

3. The excretory organs by which the body deals with these metabolic processes and eliminates them are defective. The organs chiefly concerned are the liver, the kidneys (both of which show marked post-mortem lesions), the bowels, and the skin.

Hence the treatment is: I. To deliver when possible. II. To avoid further metabolism. III. To aid excretion. IV. Symptomatic.

I. Delivery when possible. We do not advocate accouchement forcé in any form. We wait until the os is sufficiently open and the head fixed enough to apply forceps, or until the os is sufficiently open to deliver as a breech. Labour in eclampsia is apt to be quiet and painless. Fear of sepsis keeps us from making unnecessary vaginal examinations; therefore we often find labour well advanced, even so far as the descent of the head to the pelvic floor, before recognizing the onset of labour.

II. To avoid further metabolism.

1. **Starvation.** Food leads to the metabolism of digestion. We give no food either by mouth or rectum. There is no fear of starving the patient. We have never seen the fits last continuously for three days, and food may be discontinued for three days without great harm.

2. **Accouchement forcé.** This treatment is founded on

the theory that the foetus or the placenta is the source of the eclamptic toxin. It consists of rapid opening of the closed cervix and immediate extraction of the foetus.

The objections to accouchement forcé are that it leads to severe shock; if performed during the convulsive period it increases the irritation of the poisoned nerve centres; sepsis is liable to arise after it; nor have any statistics covering long periods of time yet been published that show its superiority as a treatment over the treatment adopted at the Rotunda Hospital and elsewhere.¹ Until such statistics are forthcoming, and convincing, we prefer to treat our cases by less drastic measures than accouchement forcé.

3. Morphia. Morphia decreases metabolism, and hence temporarily and partially puts the metabolic sources out of action. It decreases the cerebral irritability and controls the fits. It does not depress the heart, and probably has no effect on the secretion of the kidneys.

4. Washing out the stomach. The stomach is washed out to get rid of any food in it. In severe eclampsia digestion is in abeyance. Hence, washing out the stomach will remove food which would undergo fermentation if left.

III. Eliminatory or excretory treatment.

1. Purging, and washing out the bowel. The bowel is an excretory organ, as well as the kidneys. Getting rid of contained faeces not only prevents further absorption of toxins but helps the eliminative action of the bowel.

2. Sweating. The skin is a poor excretory organ. We are doubtful whether the circulatory depression produced by sweating the patient is compensated by the feeble excretion produced. We do not sweat our patients.

3. Urinary excretion. Urinary excretion is very important. The amount and specific gravity of the urine excreted are counts of the amounts of solids excreted. When the secretion of urine is free the case will do well.

¹ Professor Bumm's statistics at the Charité, Berlin, 1904-9. Three hundred and thirty cases with 17·7 per cent. mortality. Cases in which the uterus was emptied within six hours of the first convulsions, 8·8 per cent. mortality. Foetal mortality, 21·7 per cent. 'Kritisch-statistische Betrachtungen über die in der geburtshülflichen Klinik der Kgl. Charité von 1904 bis 1909 beobachteten Eklampsiefälle, von Abraham Zyskowitz.'

4. Bleeding. It is an unproved assumption that the toxins in the system are contained in the blood stream; like the toxin of tetanus they may travel through paths other than the circulation. Bleeding depresses the heart, and as the majority of our fatal cases died from heart failure we do not bleed.

5. Infusion. The infusion of fluids into the breasts in normal animals leads to increased diuresis. In the past we used normal saline solution. But it has been shown that salt, when the kidneys are diseased, is not excreted, and leads to the locking up of fluid in the more solid tissues. In other words, it increases oedema. In profound toxæmias we infuse one pint, twice a day under the breast, of a solution of sodium bicarbonate $\frac{3i-5ij}{\text{pint}}$ to the pint. The injection of sodium bicarbonate has been found to arouse patients from diabetic coma. However, our experience of sodium bicarbonate in the profound toxæmia of pregnancy does not justify more than the suggestion that it may be better to substitute sodium bicarbonate for sodium chloride.

IV. Treatment of special signs.

1. The convulsions. Chloroform and chloral hydrate control the fits, and so limit the muscular metabolism and cerebral exhaustion due to the fits. But chloroform and chloral act like the eclamptic poison itself in depressing the heart. For this reason we use morphia and do not use chloroform, chloral, bromides, or veratrum viride.

2. Heart weakness. To support the heart we rely mainly on digitalin and alcohol given hypodermically. We rarely use strychnine, for strychnine itself tends to produce convulsions.

3. Respiration. The respiration is depressed by morphine. Atropine counteracts this depression produced by morphine. We therefore give atropine gr. $\frac{1}{100}$ when necessary. Scopolamine is not unlikely to prove a useful substitute for atropine.

How to carry out the treatment. Having discussed the general principles of treatment, we proceed to describe the routine treatment as carried out at the Rotunda Hospital.

In describing this treatment, it is to be understood that, if at any time owing to the dilatation of the os, &c., delivery becomes possible by forceps, or extraction of the breech, it is to be undertaken at once.

When a patient is brought into hospital and eclampsia is diagnosed, she is put to bed, and half a grain of morphine sulphate is injected subcutaneously. If further fits occur, another quarter of a grain is given. It is not desirable to combine atropine with each dose. This dose is repeated in two hours, if necessary, and we give up to two grains in the twenty-four hours. We have seen the respirations fall to six a minute in some cases from the morphia, but provided it is then stopped the warning comes in time, and we have never seen any harm result from it. Three grains in twenty-four hours have been recommended, but we think this is too much.

If the patient is conscious she is given one and a half drachms of compound jalap powder, or two ounces of castor oil, or three ounces of mist. sennae co. She is also made to drink large draughts of water.

If unconscious or intractable, we wait for a quarter of an hour, to allow her to come well under the influence of the morphia, and then pass a stomach tube. *To pass a stomach tube*, lubricate the tube with glycerine or dip it in water. Put a gag into the patient's mouth. Put a finger well to the back of her tongue, and push the stomach tube quickly down the oesophagus.

We wash out the stomach with successive pints of warm water, pouring a pint through the funnel, and then lowering the funnel over a bath on the floor to allow the fluid to run away by siphon action. We continue until the return is clear. Half a pint of water is left in the stomach. Before withdrawing the tube, we pour in two ounces of castor oil with three drops of croton oil and other medicine as needed. Castor oil is sticky, and does not pass readily down the tube. To make it run in, pour a little hot water on the top of it, and when it has entered the tube, squeeze the tube between the finger and thumb from the funnel downwards as it is withdrawn.

We then turn the patient on her side. A long, soft rubber tube, lubricated with glycerine, is pushed through the anus, and as high up the rectum as possible. We pass twelve inches of the tube into the bowel, for the higher the tube passes, the more bowel is cleansed. Allowing the water to run whilst the tube is being pushed in makes its progress easier, for the flow of water separates the apposed surfaces of the bowel. We wash out the bowel with warm water precisely in the same way as the stomach is washed out, using a pint at a time and repeating until faeces stain the return flow. This is tedious, and it is sometimes half an hour before the return flow is stained with faecal matter. We leave about one pint of water in the bowel.

We next pay attention to relieving the congestion of the kidneys. Hot poultices of linseed meal are applied every two hours to the loins. The poultices must not be too hot. A temperature which does not injure the skin of a healthy woman may injure the skin of an eclamptic.

We then pass a catheter, and withdraw her urine, measuring and examining it.

If the patient is profoundly unconscious, we infuse two pints of sodium bicarbonate solution under the breasts. If she is still profoundly unconscious at the end of eight to ten hours we again infuse.

The patient is always kept on her side until properly conscious. She is put on one side for two hours, and then changed to the other side. This is of great importance in comatose and semi-comatose patients to enable the saliva to trickle into the cheek and out of the mouth. If she lies on her back, it trickles over the back of the tongue and down the insensitive larynx, and adds to the oedema of the lungs.

No food is given to the patient until she has obviously recovered from the fits. Then milk and hot water are given. No medicine is administered by the mouth unless she is quite conscious, for swallowing is in abeyance, and the medicine is as likely to go into the lungs as the stomach. For a similar reason we do not put a gag in the mouth, except during a fit to prevent the tongue being bitten, or

whilst the stomach tube is passed, for a gag altogether abolishes the power of swallowing under ordinary circumstances. It is almost impossible to swallow with the teeth separated.

If the heart shows signs of failing, we inject ten to twenty minims of brandy or whisky with digitalin gr. $\frac{1}{100}$ under the cleaned skin. But when the heart begins to fail the case is very serious, and nothing seems to restore the failing circulation.

We have now done all that is immediately necessary to the patient. With the exception of changing her position from time to time, and renewing the poultices to her loins, she is left in a darkened and noiseless room and not disturbed. A nurse sits by her to put the gag in her mouth should she have a fit, to keep an hourly reckoning of her pulse, and to report her condition should she need morphia or heart tonics. She is left in this way for eight to ten hours.¹ If at the end of this time she shows no improvement, she is again infused with a pint of fluid under the breasts. If her bowels have not opened spontaneously as the result of the purge, the bowel is again washed out. A catheter is passed, and the urine measured and examined.

If at the end of another six hours the bowels have not acted spontaneously, and the patient is still too drowsy to swallow, we give another purge, such as five grains of calomel with three ounces of mist. sennæ co., by the stomach tube.

We are not satisfied unless the bowels are opened between four or six times in twenty-four hours. In short, we place our faith, as regards the treatment of eclampsia, mainly in morphia and a thorough emptying of both the upper and lower bowel.

The nurse in charge of a case of eclampsia should be an experienced and capable woman who thoroughly understands the performance of artificial respiration and the administration of oxygen. That they may be necessary in any case has been proved to us over and over again. If breathing ceases at any time, either during or between fits,

¹ A gag can be made by wrapping a handkerchief or bandage round a piece of firewood or the handle of a spoon.

the patient's head should be lowered over the edge of the bed, the jaw brought forward, and artificial respiration resorted to vigorously. Under these circumstances it is a very good plan to turn the patient on her side, and, catching her back hair, twist her face down towards the floor. When this manœuvre is adopted with the head hanging over the edge of the bed, the mucus collected in the larynx, which is more than likely the cause of the obstruction, will pour out through the mouth and nose. Only a few seconds of such position is necessary.

How to treat a patient when the eclamptic fits have passed away, but the child is not born. The treatment is in every way identical with that described under the severer forms of albuminuria.

How to treat a patient when the eclamptic fits have passed away, and the child has been born. The treatment is again similar to that for severe albuminuria. The urine, which may have been loaded with blood and albumen, changes to normal or almost normal with a trace of albumen in a remarkably short time, in fact, we have known it change from the urine of acute nephritis, with blood, albumen and epithelial and granular casts in abundance, to a clear, limpid and abundant urine with merely a trace of albumen, within twenty-four hours of the cessation of fits. She should be kept on a liquid diet for a week after the disappearance of all albumen, and should stay in bed for a fortnight after its disappearance.

Results of the present treatment at the Rotunda. From 1903 to November 1911, we have treated seventy-four cases with six deaths, a mortality of 8.11¹ per cent. The foetal mortality was 39 per cent. Half of these children were macerated or so premature as to be incapable of living.

HYDRAEMIA

Whether or not the condition of hydraemia is due to the toxæmia of pregnancy cannot be said. It produces

¹ If statistics from extern maternity are added this percentage mortality falls to 7.61.

the same oedema of the legs and vulva that sometimes appears with albuminuria. There is, however, no albumen in the urine.

Signs and symptoms. It occurs late in pregnancy. The oedema may be very great and the labia swell to such a size that the patient cannot walk, and the stretched skin may even slough. If labour comes on the oedematous tissues may be badly torn.

Treatment. The treatment is to attend to the usual hygiene of the patient, whenever slight oedema of the legs appears. Examine her urine, keep her bowels open once or twice a day, attend to her appetite, let her drink water and let her take some exercise unless this increases the oedema of the legs. Fresh air and good food are essential. Give her an iron tonic or malt and iron three times a day. Avoiding food that contains salt diminishes oedema. If the oedema is more advanced, keep her in bed and treat her in the same manner. Should the labia become very swollen, wash the stretched skin carefully and lightly with soap and water and prick through the skin in several places with a sterile surgical needle. Clear fluid will trickle out. Cover the vulva with sterile wool, and change this when it is soaked.

The oedema quickly disappears after the birth of the child.

CHAPTER VIII

THE REMAINING ABNORMALITIES OF PREGNANCY

Backward Displacement of the Gravid Uterus—Prolapse of the Uterus—Pendulous Abdomen or Anteflexed Uterus — Hydramnios — Oligo-Hydramnios — Tumours and Pregnancy—General Diseases and Pregnancy.

THESE abnormalities of pregnancy are not grouped together because they have any clinical or pathological connexion with each other, as was the case with the other two groups.

BACKWARD DISPLACEMENT OF THE GRAVID UTERUS

The normal position of the uterus is one of anteversion with slight anteflexion. When such a uterus becomes pregnant, at the end of the third lunar month it rises out of the pelvis and becomes an abdominal organ. This it does readily, for the posterior surface of the pubic arch, against which the fundus rests, does not project or overhang.

But the case is different when a retroverted uterus becomes pregnant. At the end of the third or during the first half of the fourth lunar month of pregnancy it should rise out of the pelvis and become an abdominal organ. To do this the fundus, which has been resting against the anterior surface of the sacrum, has to pass the sacral promontory. The very name of promontory shows that it projects. This, then, is the difference between an anteverted and retroverted gravid uterus, that in rising up into the abdomen the former has no promontory or projection to pass and the latter has. Occasionally the retroverted gravid uterus fails to pass the sacral promontory, and incarceration of the uterus in the pelvis occurs.

Retroversion is as a rule accompanied by congestive endo-

metritis, which leads either to sterility or abortion. Consequently pregnancy in a retroverted uterus which progresses beyond the third month is uncommon.

Nevertheless it does occur, and the course it pursues is of great practical importance.

Course of retroverted gravid uterus.

1. Most usually the uterus slips past the sacral promontory and follows the lines of an ordinary pregnancy (spontaneous reposition).

2. The posterior wall of the uterus is bound down by adhesions, which do not yield. The anterior wall is not bound down and anterior development results; in other words, the foetus bulges the anterior wall up into the abdomen as growth progresses. The uterus thus assumes an hour-glass shape, one portion of the foetus being in the pelvic segment, the other being in the growing abdominal segment. This partial incarceration may go on to full term, by which time the adhesions are so softened that the contractions of the uterus are strong enough to pull up the pelvic segment and make its contents present at the os.

In some cases this does not occur; here, when labour at full term sets in, the cervix is found looking forwards and upwards and crowded up in the anterior fornix against the pubic bone. In such cases, if an attempt to push the pelvic segment and its contents up out of the pelvis fails Caesarean section is indicated.

3. The growing uterus does not rise out of the pelvis, but becomes incarcerated and fills all available space in the pelvis, crushing and squeezing all the other pelvic organs. The symptoms are those of pelvic pressure.

Signs and symptoms of incarceration.

Bladder and urethra. The bladder and urethra are the organs most affected by the pressure of the gravid uterus. The normal pressure of the gravid uterus merely produces irritability of the bladder and frequency of micturition. But the pressure of the incarcerated uterus leads first to stretching and blocking of the urethra and retention of urine followed by overflow, secondly to injury of the base of the

bladder, which is squeezed against the pubic bone with resulting cystitis, and lastly to sloughing of the bladder with extravasation of urine, and death of the patient. Over-distension by interfering with the blood supply will predispose to cystitis and necrosis.

The first symptom of which the patient complains is increased frequency of micturition. She can hold her urine only for a very short time. Soon great difficulty is experienced in passing urine; following this there is complete retention for some hours and then constant dribbling (*ischuria paradoxa*).

This first symptom may not excite suspicion that anything except normal pregnancy is present. But when the patient has missed three or four periods and urine is continually dribbling, and a short time previously she failed to urinate for a whole day, a thorough examination is imperative. It is the bladder symptoms that suggest incarceration of the gravid uterus. Pressure on the rectum causes constipation, with a bearing-down sensation. Pressure on the veins causes swelling of the veins of the lower limbs, the vulva, and anus, pressure on the nerves shooting pains down the legs. But these symptoms are all of minor importance compared to the bladder symptoms.

Examination of a patient with suspected incarcerated gravid uterus. Examine the abdomen. The bladder will be up to or nearly up to the umbilicus. It has again and again been mistaken for an ovarian cyst or a pregnant uterus, a mistake which will not occur if a catheter is always passed before a vaginal examination is made. We therefore have first to consider the use of the catheter in such cases.

How to pass the catheter. The patient lies on her left side with her hips well out to the edge of the bed, or, better in the cross-bed position. There must be a good light. Your hands must be surgically clean. Clean the labia and the orifice of the vulva with great care, washing them with soap and water, and washing the soap off with warm water. Sponge the orifice of the urethra thoroughly with wool soaked in biniodide of mercury (1-1000), for any germs

introduced into the damaged and distended bladder have a far greater chance of setting up acute cystitis than when introduced into the healthy bladder. It is by no means always easy to find the orifice of the urethra. The distended bladder rises in the abdomen and pulls up the urethral orifice. Consequently the meatus lies within the vagina. Use a No. 10 gum elastic male catheter as the urethra is elongated.

To find the meatus. Remember that it occupies the centre of a transverse wavy line that divides the smooth vestibular mucous membrane from the rugose vaginal mucous membrane. This line is the base line of the vestibule, a triangular area, the sides of which are formed by the labia minora and the apex by the clitoris. Separate the labia with the fingers, or pass in the half-hand as a posterior speculum to expose the meatus, and pass the catheter slowly and carefully.

Sometimes urine will not flow out after the catheter has been passed. Either (1) some necrotic mucous membrane has blocked the eye of the catheter, or (2) the catheter may have been pushed into the softened wall of the bladder itself, or (3) the female catheter may be too short to reach the bladder. Withdraw the catheter, clear it with the stylet and pass it again. A great quantity of urine will flow away and confirm the diagnosis of incontinence due to retention.

Sometimes the catheter cannot be passed in these cases. The urine should then be drawn off by supra-pubic puncture.

How to do a supra-pubic puncture. Shave the hair over the pubes and carefully cleanse a small central area of skin with soap and water, ether and biniodide of mercury. With clean hands plunge a boiled trocar and cannula of small size boldly into the middle line, half an inch to an inch above the pubes. If the skin and instrument are clean, there is no danger, and the operation can be repeated on several occasions, if necessary.

From the above it will be seen how serious the condition may become and how carefully aseptic one has to be. The rotten bladder wall foretells the death of the patient. Either rupture or perforation by ulceration leads to

extravasation of foul urine and sepsis; or a severe cystitis is set up, which may quickly or slowly kill the patient by sepsis or lead to ascending pyelo-nephritis or pyaemia.

Having emptied the bladder and ascertained that the abdominal tumour was a full bladder, make a bimanual examination. For this the patient must be in the cross-bed position.

What is felt by bimanual examination. Pass two fingers into the vagina and examine the vulva and vagina for the blueing of pregnancy. Then feel that the posterior fornix is obliterated by a large, elastic, globular swelling, which fills up the vagina. The cervix will be pushed well up behind the symphysis. It is always felt with great difficulty and sometimes cannot be reached. The anterior vaginal wall and wall of the anterior fornix are stretched. Bimanually no organ occupies the place of the normal anteverted uterus.

Exclude the rarer causes of pressure on the bladder with retention and overflow of urine.

Diagnosis. Eliminate the important question of pelvic haematocele by the absence of any history of bleeding or signs of internal haemorrhage, by finding that the wall of the anterior fornix is stretched, that the cervix looks directly forwards and upwards, not downwards, and by failing to feel the anteverted uterus bimanually.

Exclude a large fibroid in the posterior wall of the uterus by the menstrual history, by the stretching of the wall of the anterior fornix, by the fact that the cervix looks forwards and upwards, not downwards as it usually does with a large fibroid, by failing to feel the uterus bimanually, and by the difference in consistence.

The signs of pregnancy also point to a retroverted gravid uterus. Exclude a fibroid in the posterior wall of the uterus associated with pregnancy, again by the difference of the anterior fornix, the direction of the cervix, by the absence of the body of the anteverted uterus, and by the consistence.

Replacement of the uterus.

Before incarceration. When you find a backwardly displaced pregnant uterus (after emptying the bladder) but as

yet without pressure signs, carefully exclude haematocoele and replace the uterus bimanually or with a bullet forceps on the cervix and finger in the rectum as described for incarcerated uterus. Keep it anteverted by a Smith-Hodge pessary until the fifth lunar month. Do this, too, if signs of threatening abortion are present. Failing to replace it by either of these methods, you may eventually succeed if the patient returns at short intervals, or it may right itself.

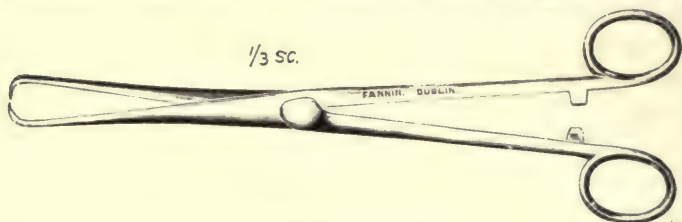


FIG. 62. Bullet forceps.

After incarceration. The bladder should be empty. We usually attempt to replace the uterus when the woman is

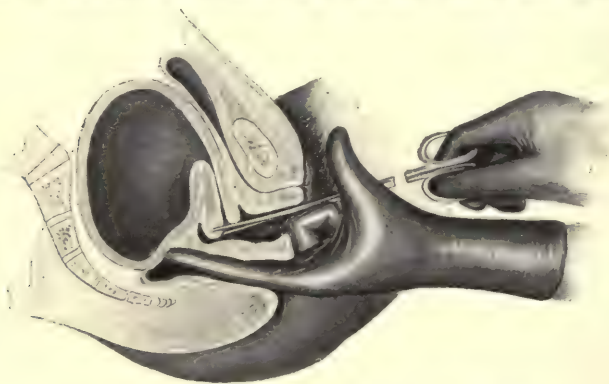


FIG. 63. Replacing a retroverted gravid uterus.

in the cross-bed position. There is no doubt the knee-elbow position is an excellent one, but it is very ungainly, and it is practically impossible to anaesthetize a patient in this position. We, therefore, try first bimanually, then with a bullet forceps and one finger in the rectum and one in the vagina, giving an anaesthetic if necessary.

The vagina is douched. Put a sterile bullet forceps

on to the posterior lip of the cervix. It is not always easy to do this. If you cannot reach it, catch the uterus as near the posterior lip as possible. Then place one finger in the rectum and one in the vagina. With these push the body of the uterus upwards and to one side of the sacral promontory, and at the same time pull the bullet forceps downwards. If this fails after steady pressure, or if the patient's abdominal muscles are tense, give her an anaesthetic until there is complete relaxation. Then put two fingers into the rectum and try again, steadily maintaining pressure for some minutes.

Failing replacement, we think it is better to wait for twelve to twenty-four hours, emptying the bladder meanwhile every eight hours by a catheter. Then repeat the same method, which will often meet with success. If successful, keep the uterus in position for two months with a Smith-Hodge pessary. Replacement in these cases is not the simple matter it is in an unimpregnated uterus. The cervix can be pulled down without any movement resulting in the fundus, and the softened fundal wall can be indented with the finger in the rectum without any general movement of the uterus.

What to do if the second attempt fails. The usual teaching is to induce abortion. Do this as follows: Cut the top off a catheter and bend the end with the stylet into a hook. Pull down the posterior lip of the cervix with a bullet forceps and pass the hooked catheter through the os. Withdraw the stylet and pass a filiform bougie through the catheter, which, inserted and allowed to remain between the membranes and the uterus, induces abortion. Rupture of the membranes by this method may be adopted as an alternative. But it is often quite impossible to do any of these things, so jammed is the cervix against the vault of the vagina. Then resort to drawing off the liquor amnii by puncturing near the cervix through the posterior vaginal and uterine walls, either with an aspirating needle or with a trocar and cannula. The liquor amnii escapes, pressure is at once relieved, and abortion ensues.

In the Rotunda we do not do this. We open the abdomen

in the middle line, lift the uterus up and fix it in an anteverted position by ventro-suspension. Adhesions can always be broken down or divided, and it seems inconceivable that the uterus could not always be brought into and kept in position in this way.

The operation of ventro-suspension is described in books on gynaecology. Briefly the steps are: Prepare the patient as for Caesarean section. Open the abdomen by a median incision four inches long, ending at the symphysis. Put the patient in the Trendelenberg position to keep back the intestines from the field of operation. Pass the fingers down between the sacrum and the uterus, breaking down any adhesions that yield. Catch tougher adhesions between forceps and divide them with scissors. If the intestines are adherent to the uterus and cannot be peeled off, slice off a thin layer of the uterus with the adherent intestine rather than attempt with force to peel off the intestine, for it is readily damaged. Pull the freed uterus up by the hand. Pass a fine silk suture (No. 3) through the peritoneum at the lower angle of the wound, then horizontally for half an inch through the fundus of the uterus, not very deeply but just deep enough to include the peritoneal surface, and finally through the peritoneum on the opposing side at the lower angle of the wound. Catch the two ends of this suture with forceps. Pass another fine silk suture in the same way, traversing the uterus half an inch posterior to the first. Tie these sutures. Ligature any bleeding adhesions. Remove forceps. Count the swabs used. Sew up the abdomen in three layers.

A pessary in the vagina is not needed. The operation causes peritoneal adhesions to hold the uterus in place. They stretch as the uterus rises with the progress of pregnancy, but do not allow retroversion to occur.

The after-treatment is similar to that of Caesarean section, the patient being kept in bed from two to three weeks.

The operation is not as a rule difficult.

Cystitis. The incarceration has been overcome, but the inflammation of the bladder due to it remains. The cystitis may be very severe after the uterus has been put

into position. Induction of abortion may be necessary to save the patient's life; or acute followed by chronic cystitis makes her an invalid.

Cause of cystitis. Whenever tissue gets damaged in the body, bacteria are very liable to reach and attack it. The bladder is damaged by over-distension from the retained urine interfering with the circulation and by direct pressure from the incarcerated uterus. The only path of invasion which can in some degree be controlled is that opened by passing a catheter, and that is why careful cleansing of the urethral orifice and the use of a sterile catheter passed by sterile hands is imperative. If the pressure has been prolonged, direct sloughing of the base of the bladder occurs, or perforation by ulceration. More commonly the patient is seen before such grave results have ensued, but the damaged bladder, invaded by bacteria, has to pass through an attack of acute inflammation.

Signs and symptoms. The patient suffers severe urethral pain when urinating, and, owing to irritability of the bladder, she has to pass urine frequently. There is tenderness over the bladder, if pressed on from the vagina or abdomen. The temperature and pulse vary according to the degree of inflammation. In severe cases the temperature may reach 104° , and the pulse be over 120. The patient is then exceedingly ill, both owing to the septic intoxication which threatens her life, and to the exhaustion due to the pain and loss of sleep from frequent micturition.

The urine is ammoniacal and turbid. It contains blood, pus, and epithelial debris. In severe cases the mucous membrane sloughs and comes away through the urethra. It has a dirty wash-leather appearance.

Treatment. Washing out the bladder. For this purpose use the ordinary douche can and a small Bozemann's catheter. Put the patient in the cross-bed position, and cleanse the orifice of the urethra. Raise the end of the Bozemann whilst the fluid flows, to empty it of air. Pass it into the bladder. Cover the exit hole of the Bozemann with your thumb and fill the bladder, until the patient feels she must pass water. Then let the fluid run out.

Again fill the bladder and let the fluid run out. Repeat until the return fluid is clear. Wash out the bladder two or three times a day with warm boric lotion. An anaesthetic is not needed. Once or twice a week inject three grains of nitrate of silver in three ounces of water, after the bladder has been washed out with boric lotion. We have found this treatment satisfactory in mild cystitis.

Drugs. Morphia or opium is needed for the severe pain of cystitis. Belladonna, hyoscyamus, benzoate of soda, cubebs, buchu, are used as in other cases of cystitis. Urotropin gr. x three times a day in a tumbler of hot water is recommended, and we think is useful.

If cystitis does not yield readily to this treatment the use of vaccines is indicated, particularly if the infection is due to the colon bacillus.

Severer cystitis. When the cystitis is severe, the bladder is intolerant of this treatment. It should not be adopted when it causes great pain or increased irritability. The treatment is then to make a vesico-vaginal fistula and drain the bladder through the vagina. It is sometimes hard to differentiate primary cystitis from that caused by suppurating kidney disease. Catheterization of the ureters will afford certain information.

Operation for making a vesico-vaginal fistula. The patient is anaesthetized. Put her in the cross-bed position, with the buttocks projecting well over the edge of the bed and the flexed legs held by assistants or in a Clover's crutch. Still better, put her on a table in the gynaecological position with a mackintosh directing the flow from under her into a large bath. Douche the vagina and pass a catheter. Make a longitudinal incision for one inch through the anterior wall, starting your incision midway between the cervix and the urethral orifice. Cut down directly on to the catheter and expose it. Keep the fistula open by over-sewing its edges with interrupted silkworm gut sutures.

After-treatment. Place pads over the vulva to receive the urine and see that they are constantly changed. Keep the patient in bed. Attend to the bowels and diet. The relief from the operation is very great. The difficulty is to

keep the fistula open, for in spite of the septic fluid that flows over its edge, it tends to close into a small hole. If the bladder is tolerant, douche through the fistula twice a day. When the cystitis is almost well, douche through the urethra. When it has disappeared, take out the stitches, if they have not already cut through, and the fistula heals naturally or after the paring and uniting of its edges.

Induction of Abortion. When cystitis exists together with pregnancy, the cystitis often goes from bad to worse. The question of induction of abortion then arises, and we think it is as a rule too long deferred. In our experience, if the above treatment does not relieve the patient, the presence of pregnancy, whether owing to pressure or congestion, adds so greatly to her danger that a fatal termination is inevitable. The danger of sepsis after induction of labour is, of course, considerable, but we think it the lesser evil of the two. Therefore, if the treatment given does not relieve the patient do not defer the induction of abortion.

The method we recommend is to dilate the os with Hegar's dilators, after very thorough scrubbing of the vagina with soap and water before the douche.

PROLAPSE OF THE UTERUS IN PREGNANCY

Prolapse of the cervix and uterus constitutes a serious complication of pregnancy and labour.

During pregnancy the softened and congested tissues are very liable to injuries which may result in ulceration. During labour this ulceration may give rise to sepsis.

In many cases when the os opens the cervix is pulled up and retracted over the head, occasionally incarceration of the cervix occurs, leading to sloughing and sometimes to rupture of the uterus.

Treatment. During pregnancy keep the uterus in its place by means of a ring or larger Smith-Hodge pessary.

If the prolapse persists during labour, forcible dilatation and rapid delivery is the safest form of treatment. Delivery by splitting the cervix, when performed skilfully, is probably the best treatment.

ANTEFLEXED UTERUS OR PENDULOUS ABDOMEN

During the latter weeks of pregnancy the uterus falls downwards and forwards and the abdomen becomes more pendulous. This characteristic is exaggerated in contracted pelvis and in relaxation of the abdominal muscles, which occurs frequently in multigravida. Twins and hydramnios also cause the abdomen to become more prominent. An abdominal binder worn during pregnancy will hold up the uterus and make the patient more comfortable.

HYDRAMNIOS

Hydramnios is excess of liquor amnii. The normal amount of liquor amnii is about two pints. It is considered hydramnios if the liquor amnii exceeds five pints.

Causes. The question as to the derivation of the amniotic fluid has not yet been settled. It is supposed to be a transudation from the maternal vessels and secretion from the amnion and sometimes the foetal urine is thought to add to the quantity. Until the derivation of the amniotic fluid is known the causes of hydramnios must also remain unknown. At present it is impossible to foretell or prevent the onset of hydramnios. Syphilis is held to be a common cause. Foetal malformations, such as hydrocephalus, anencephalus, spina bifida, and clubfoot, not infrequently accompany hydramnios, and cases have been reported in which there was interference with the foetal circulation either in the cord or within the foetus. Maternal renal or heart disease is also sometimes associated with hydramnios. It is more common in multigravidae than primigravidae. It is also more common in twin pregnancies, usually limited to one sac. The membranes which present are seldom the over-distended ones and the result of rupturing them is frequently disappointing.

Onset. The onset may be either acute or chronic. The chronic is by far the more common. Acute hydramnios comes on within twenty-four hours or a few days. It may cause trouble as early as the sixth lunar month of pregnancy.

Symptoms and signs. The patient suffers from pressure symptoms, owing to the increased size of the uterus. These are more marked when the onset is sudden. She has great

- difficulty in breathing and has to be propped up by pillows at night. Her circulation is impeded, her lips are blue, and her hands and feet are cold and blue. Her legs swell. She has indigestion and vomiting. Albumen often appears in the urine.

If the formation of the fluid is slow, the system gradually accustoms itself to the increasing size of the uterus, and we have ourselves measured twenty-six pints of amniotic fluid, which came from a woman who did not show marked symptoms of pressure.

On abdominal examination the uterus is found larger and rounder than usual. It is difficult to detect the outline of the stretched uterus in many cases. There is a marked fluid thrill, and the outlines of the foetus, the foetal movements and heart sounds, are obscured or obliterated. By a vaginal examination distinct ballottement, even at full term, may be elicited. The os is often well open for days before labour starts. This is due to overstretching of the cervix. The tumour is too large for a big bladder and is distinguished from ovarian cyst by the signs of pregnancy and the history.

Results. The overstretched uterus often discharges its contents before full term, and so premature labour is common. During labour the presenting part is not grasped by the lower uterine segment, and the foetus floats in the liquor amnii. Sudden rupture of the membranes may be accompanied by extreme shock. The rush of fluid may carry down with it the part of the foetus nearest the internal os. Malpresentations and prolapse of the cord, therefore, are common. The overstretched uterus contracts badly, hence labour is slow and the delivery of the placenta may be delayed. The absence of proper contraction and retraction favours the occurrence of post-partum haemorrhage.

Treatment. If the pressure symptoms are severe and the woman's life threatened, the uterus must be emptied. Moreover, the only justifiable way of inducing labour is by rupturing the membranes. If hydramnios is discovered when the patient is in labour—for the os is always open owing to the pressure of the fluid—the membranes should

be ruptured in the manner to be described in order to control the rush of liquor amnii.

How to rupture the membranes in hydramnios. Put the woman in the cross-bed position and empty her bladder. An anaesthetic is not necessary. Cleanse your hands and the external genitalia, as before a vaginal examination, and have a sterile catheter stylet ready.

Lubricate the gloved hand with soap and pass the whole or half hand into the vagina. Pass your forefinger into the cervical canal and through the internal os, which will always be opened sufficiently to permit its passage. Pass it between the membranes and uterine wall, as far up as possible. Then taking the catheter stylet in the other hand, run it up along this finger into the uterus. Scratch through the membranes with its point as high as possible in the uterus. By this high puncture the outflow of fluid is controlled. The contracting uterus presses down on the hole in the membranes and lessens the outflow of fluid. Another method of control is to keep a hand in the vagina. The vagina contracts round the hand, which acts as a plug and allows the fluid to run out slowly. Allow as much fluid to escape as will. When the patient is in the recumbent position and the labour pains are absent or slight, sufficient fluid will remain in the uterus. Feel in order to assure yourself that either the breech or vertex presents and that the cord is not prolapsed. If any abnormal presentation or prolapse of the cord is present, treat it according to prescribed rules. Keep the woman in bed. Labour very probably will start within twenty-four hours and the child be delivered naturally.

Sometimes hydramnios occurs in one sac of twins, which cannot be reached because the sac of the other child presents. In that case rupture the membranes of the first child. When it has been delivered, treat the second sac according to the above rules.

OLIGO-HYDRAMNIOS

More rarely there is a diminution in the amount of amniotic fluid. The results to the mother are that the

foetal movements, not being checked by the liquor amnii, are more painful, and secondly that, the dilating bag of waters being absent, labour is prolonged. The results to the child are those due to amniotic adhesions, which may form when the child is in direct contact with the membranes. Amputations of the foetal limbs and other deformities may ensue. Amputations have also been attributed to winding of the cord around limbs, but a little consideration will show how impossible this must be, for even slight pressure on the cord would kill the child and growth would cease.

It is not possible to prevent, diagnose, or treat oligo-hydramnios. The presence of adhesions causing deformity of the child when born, and the absence of sufficient liquor amnii give the name to the condition.

TUMOURS AND PREGNANCY

Ovarian cysts. Ovarian cysts, when diagnosed during pregnancy, should be removed. They are apt to obstruct labour or be seriously damaged by the process of labour. They become twisted, gangrenous, suppurative, filled with blood, or rupture. Sometimes they produce such serious symptoms during labour that they have to be removed. Especially is this the case when they cause obstruction. Sometimes they can be pushed out of the way and sometimes they may be aspirated. The rules for ovarian cysts occurring with pregnancy are—

1. If discovered during pregnancy—ovariotomy.
2. If discovered during labour and causing obstruction:
(a) attempt to push the tumour out of the way of the advancing foetus from the vagina, (b) if this fails and the tumour is below the foetus, puncture it through the vaginal wall with a trocar and cannula, (c) both failing, do an ovariectomy in spite of labour.
3. Watch an ovarian cyst carefully throughout the puerperium, so that any evil change produced in it by labour may be recognized early and treated.

Myomata. Myomata are common tumours and therefore not infrequent with pregnancy. The submucous and inter-

stitial myomata tend to produce abortion or sterility from the endometritis that they cause. But their frequency is greater than the sterility they produce. They may by the

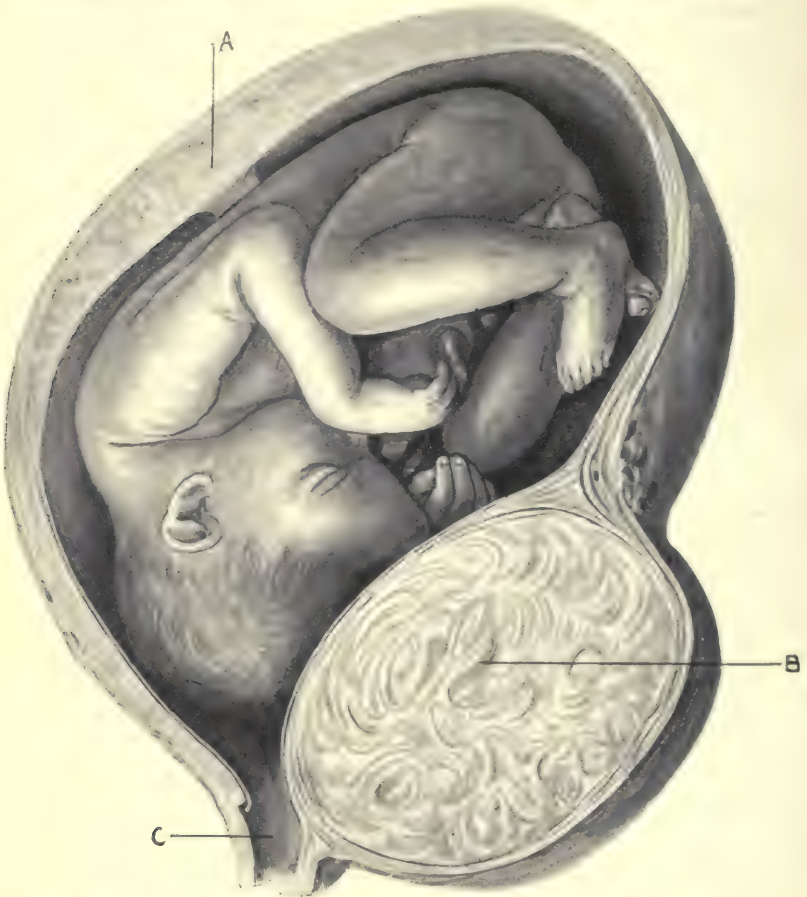


FIG. 64. Myoma causing obstruction to labour. A, placenta; B, myoma; C, cervix. (Rotunda specimen.)

addition of their bulk cause pressure on the bladder, with retention of urine, in the earlier months of pregnancy, in which case the patient must be made safe and well, without regard for her pregnancy. In such cases the myoma has occasionally been removed by myomectomy and pregnancy progressed to normal delivery.

The excessive menstruation they tend to produce is repeated in their tendency to cause accidental or post-partum haemorrhage. Their interference with contraction and retraction of the uterus results in a further liability to post-partum haemorrhage. The alteration in shape of the uterus caused by them leads to malpresentations. If they are damaged by labour they may suppurate, become gangrenous, and lead to sepsis. Rupture of the uterus has been laid to their charge. Myomata of the cervix or lower uterine segment may cause complete obstruction to labour. Pedunculated subserous tumours may pass into the pelvis in front of the child and cause complete obstruction, or their pedicles may become twisted during labour and they bleed, suppurate, or become gangrenous. These sequelae show what a serious complication the presence of a myoma may be. Yet in spite of this alarming list it is surprising how frequently normal delivery is completed by a uterus beset with many large myomata. They are either situated above the lower uterine segment or during labour are pulled up out of the way. On the other hand myomata in the cervix or broad ligament are not pulled up out of the way when the lower uterine segment is formed and their presence is a serious complication to labour. These tumours occasionally become surprisingly flattened by pressure of the head and allow normal delivery in spite of the apparent absolute obstruction caused by them.

Red degeneration is a form of degeneration peculiar to a myoma complicated by pregnancy. It is more of pathological than clinical interest.

Treatment :

1. If a myoma is discovered during pregnancy, leave it until labour begins.
2. If it is in the pelvis during labour, with the whole hand in the vagina or two fingers in the rectum, the patient being deeply anaesthetized, attempt to push it out of the way.
3. Failing this, open the abdomen and remove the child by Caesarean section. If the myoma cannot be shelled out

remove the uterus either by complete, supra-vaginal or sub-total hysterectomy.

4. Watch a myoma carefully during the puerperium.

Sarcoma or carcinoma. When malignant disease of the uterus is diagnosed during pregnancy, the treatment is to remove the uterus by the most complete total hysterectomy possible. If the growth is left, the child will probably die and the disease progress with great rapidity.

If malignant disease of the cervix is diagnosed during labour, the child should be delivered by Caesarean section and the uterus removed by a total hysterectomy. A malignant uterus is more easily removed at this than at any other period because of the laxity of the tissues. The damage caused by pulling the child through the cancerous cervix will in nearly all cases lead to the death of the mother either from sepsis, haemorrhage, or rupture of the uterus.

GENERAL DISEASES AND PREGNANCY

Syphilis. Syphilis is one of the great causes of abortion, miscarriage, and still-birth. It is most active as a cause of early interruption of pregnancy when the infection of the parent or parents has been recent. The investigation of parental syphilis must be carried out with tact, for any suspicion of parental immorality may bring unhappiness to a home. The diagnosis can be made by Wassermann's serum reaction without exciting suspicion.

Syphilis may be imparted to the ovum by the mother, when she herself at the time of conception is suffering from the disease or when she contracts it during pregnancy. The father can transmit it to the offspring through the spermatozoon. If the father has no infectious lesions at the time of coitus, the ovum is apt to contract the disease, although the mother escapes. Nor will she get the disease if she suckles her syphilitic infant. This exemption of the mother is termed Colles' Law.

The post-mortem changes by which syphilis may be recognized in a stillborn child are changes in the cartilage at the junction of the diaphyses and epiphyses of the long bones and the ribs. This line, instead of being a

thin, regular, blue line, becomes a thicker, irregular-edged, yellow line. Normally, it is about 0.5 mm. thick, but when affected by syphilis it is four or five times as thick as this. The liver and spleen are enlarged, on section cut firmly, and have a more translucent appearance than normal. Thus in a stillborn child, the cartilages, liver, and spleen should be examined. If unable to make a post-mortem examination or if the child is alive, its wizened undersized appearance, the thick skin of the soles and palms and possibly pemphigus on the hands and feet and dusky red patches about the buttocks are all strongly suggestive of foetal syphilis. The signs of congenital syphilis in the living child are more fully described on p. 447.

The placenta infected by syphilis shows marked changes. It is larger and paler than normal, looks greasy and unhealthy, and is often friable and flabby. The size and flabby appearance are most characteristic. The chorionic villi, when teased out in salt solution are thickened and club-shaped. In microscopic sections the villi are seen to be packed with small round cells and the vessels obliterated. Careful search almost invariably demonstrates spirochoeta in the placenta.

When clear indications of syphilis have been found, both parents will require treatment. Sometimes, when no other cause of early interruption of pregnancy can be found, giving the mother mercury and potassium iodide throughout pregnancy will bring her to full term.

Gonorrhoea. If gonorrhoea is diagnosed either before or after conception, it must be thoroughly treated. In such a case, too, douche the vagina before the birth of the child, and be especially careful in the treatment of the child's eyes.

Phthisis. Phthisis of the mother in no way prevents her becoming pregnant. During pregnancy her general condition frequently improves, but she is apt to go down hill after the child is born.

The induction of abortion is rarely undertaken in cases of phthisis.

If labour is in any way prolonged, terminate it artificially. The infant must not be nursed at the breast.

Heart disease. The later months of pregnancy and the effort of labour have a very detrimental effect on a diseased heart. Therefore, if during pregnancy there is any sign of failure of compensation, first restore the heart, and then induce labour. If the patient goes to full term, do not let her be longer than is necessary in labour. If labour breaks down the compensation of the heart, and the patient lives to become pregnant again, induction of abortion should be seriously considered. In such a case it is essential to have this treatment fortified by consultation.

Diabetes. Fehling's test not infrequently shows the presence of sugar in the urine of pregnant women, especially in the later months of pregnancy. This sugar may either be glucose or lactose. It is very necessary to distinguish between them, for whereas glucose is the sugar that accompanies the disease of diabetes, lactose or milk sugar in the urine of pregnant women can hardly be looked upon as an abnormality. The distinction between these two sugars is made either by the fermentation test or by the polariscope. Should the sugar be lactose no alarm need be felt nor treatment undertaken. Should, however, the sugar prove to be glucose, its presence suggests the possibility of diabetes. The distinction between the disease diabetes and alimentary glycosuria is a question allocated to medical treatises, but should diabetes exist coincidentally with pregnancy, the condition of the mother is generally considered to be one of gravity. Not infrequently diabetic coma supervenes and ends her life. Death of the child and premature labour are also common consequences, and the disease itself in its course may be so aggravated that the uterus may have to be emptied. Moreover, a patient with diabetes is more liable to both post-partum haemorrhage and sepsis.

Chorea. Chorea sometimes occurs in pregnant women. If it becomes severe, and does not yield to medical treatment, the uterus must be emptied under chloroform. This frequently cures the chorea, but not always. A bad prognosis should be given if chorea is accompanied by a high temperature. It must be classed among the toxæmias of pregnancy, as it is undoubtedly a bacterial disease.

Infectious diseases. Infectious diseases when severe, and especially when accompanied by high fever, frequently lead to the death and expulsion of the ovum. Enteric fever, smallpox, and others, may be transmitted to the foetus in utero. During labour great care must be taken to guard against sepsis, and, with strict aseptic precautions, labour must be terminated as early as possible, if the mother is exhausted. Pneumonia is a dangerous complication of pregnancy both to the mother and child.

Pyelitis and pregnancy. Pyelitis, due to bacillus coli, occasionally occurs in pregnancy.

The onset is sudden, with pain and tenderness on pressure in the loin, and some fever. The urine is acid and contains pus. Bacillus coli is found in pure culture in the urine.

The condition gets well when treated with rest in bed, milk diet, slight purgation, and bladder irrigations with mild antiseptics. Urotropin seems to have no effect on such urine. Occasionally this condition is very persistent and does not yield to treatment until the uterus is emptied. In such cases vaccine therapy is indicated.

PART III

ABNORMAL LABOUR

CHAPTER IX

PRESENTATIONS AND MECHANISMS

GENERAL CONSIDERATION OF PRESENTATIONS AND MECHANISMS

BEFORE proceeding to describe abnormal presentations and their treatment, we must give a brief account of the presentations and their mechanism, and for this purpose, and for the sake of comparison, must include normal presentations and their mechanism also. *Presentation* refers to the part of the foetus that lies lowest in the parturient canal, *position* to the relation of the back of the foetus to the abdomen of the mother.

Presentations. In the first vertex presentation the vertex presents, and the occiput and back are in front and to the left (left occipito-anterior). In Vertex II the occiput and back are in front and to the right (right occipito-anterior), in Vertex III the occiput and back are behind and to the right (right occipito-posterior), and in Vertex IV behind and to the left (left occipito-posterior). The head, in fact, swings round the circle of the pelvis, and the occiput occupies severally one of the four quadrants.

From these four vertex presentations, the rest of the presentations may be deduced. Thus the four different positions of the brow are similar to those four vertex presentations, only the head is neither flexed nor extended, and the brow presents. The four face presentations are similar to the four vertex presentations, only that the head instead of being flexed is extended. The four transverse arise from the four vertex by pushing the head out of the pelvic brim into the corresponding iliac fossa or loin. Thus in a first transverse, the occiput and back are to the left and

in front, but the head is not in the pelvic brim. The four breech presentations are the same as the vertex, only the child is reversed. Thus we have—

Vertex I. The vertex presents, the occiput and back are to the left and in front.

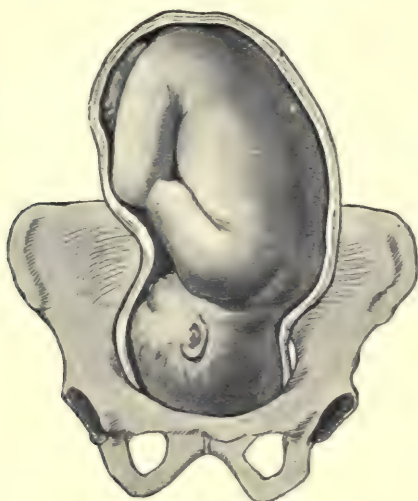


FIG. 65. Vertex I.

Vertex II. The vertex presents, the occiput and back are to the right and in front.

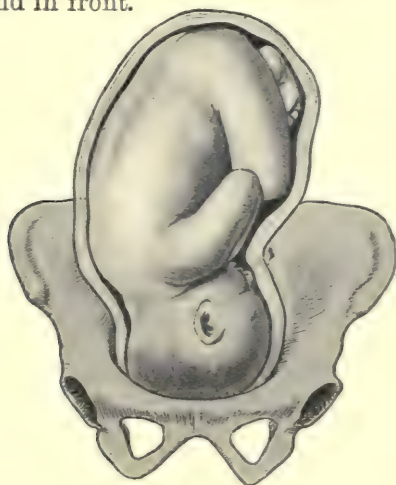


FIG. 66. Vertex II.

Vertex III. The vertex presents, the occiput and back are to the right and behind.



FIG. 67. Vertex III.

Vertex IV. The vertex presents, the occiput and back are to the left and behind.

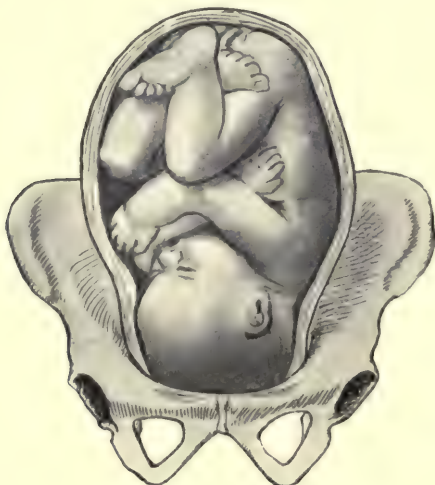


FIG. 68. Vertex IV.

Slightly extend the head: Vertex I becomes Brow I. Vertex II becomes Brow II. Vertex III becomes Brow III. Vertex IV becomes Brow IV.

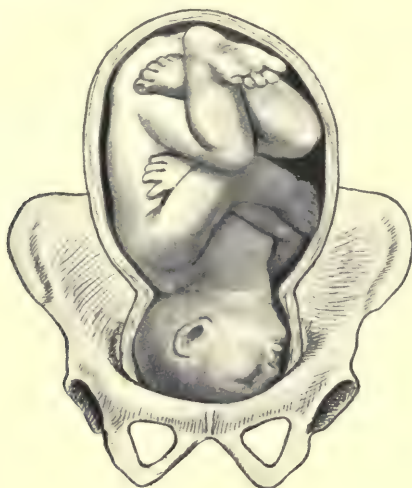


FIG 69. Brow III.

Fully extend the head: Vertex I becomes Face I. Vertex II becomes Face II. Vertex III becomes Face III. Vertex IV becomes Face IV.

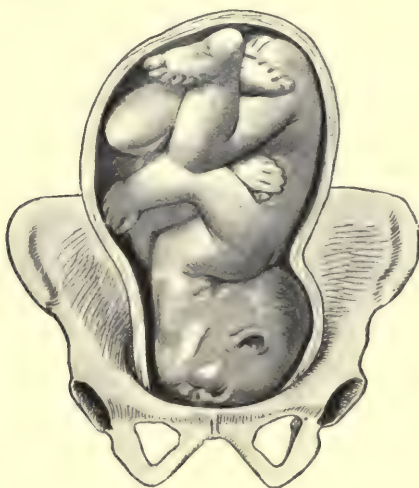


FIG. 70. Face IV.

Push the head into the iliac fossa or loin to which the occiput is directed: Vertex I becomes Transverse I. Vertex II becomes Transverse II. Vertex III becomes Transverse III. Vertex IV becomes Transverse IV.



FIG. 71. Transverse I.

Reverse the child: Vertex I becomes Breech I. Vertex II becomes Breech II. Vertex III becomes Breech III. Vertex IV becomes Breech IV.

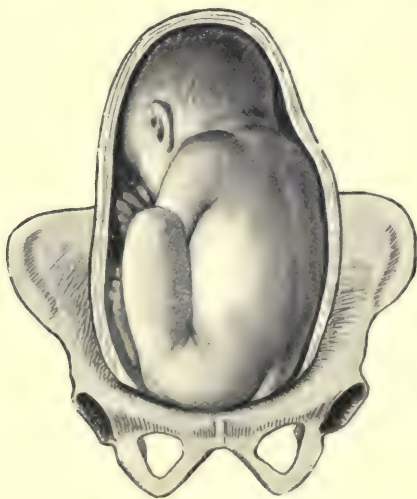


FIG. 72. Breech I.

It should be mentioned that many authorities do not subscribe to this simple method of deducing positions from the normal. With them the chin in face presentations determines the position, therefore what we call a first face presentation they would call a third, and so on.

Mechanism. In a normal presentation the vertex presents, and the child's head is born with the occiput in front and the face towards the mother's sacrum. All other cases are abnormal and are not the result of chance. There is something abnormal in the conditions present. But they do not all need assistance; indeed, with the exception of transverse presentations, all the others may be delivered by the natural efforts within twenty-four hours.

What is meant by a normal pelvis and a normal foetal skull? A great number of pelvises and foetal skulls have been measured and a general average struck. The mechanism which brings about the best adaptation of the foetal head to the pelvis, in these average cases, is the common mechanism, and is called the normal. Minute accuracy of average measurements has no practical value, for they do not apply to individual cases. The problem that presents itself in the study of the mechanism of labour is how the head is usually adapted to the pelvic canal in its passage, and in what way the normal is departed from in abnormal cases. The inner parturient canal formed by the soft tissues is dilatable.

Measurements of the pelvis. The average measurements of the pelvic inlet are—

1. Antero-posterior, or true conjugate diameter, from the sacral prominence to the top of the pubic symphysis— $4\frac{1}{4}$ inches. The obstetrical conjugate is from the sacral promontory to the nearest point on the pubes, about $\frac{1}{4}$ inch below the upper border of the symphysis. It measures 4 inches.

2. Oblique diameter from one sacro-iliac synchondrosis to the pectineal eminence on the opposite side—5 inches.

3. Transverse diameter, the greatest available width of the pelvic inlet—5 inches. The word available is used, because the sacral promontory pushes the head forward to the mid-transverse diameter, which is 5 inches. The diameter of

the transverse, a little posterior to the centre, is $5\frac{1}{4}$ inches. *The transverse diameter is in reality a little smaller than the*

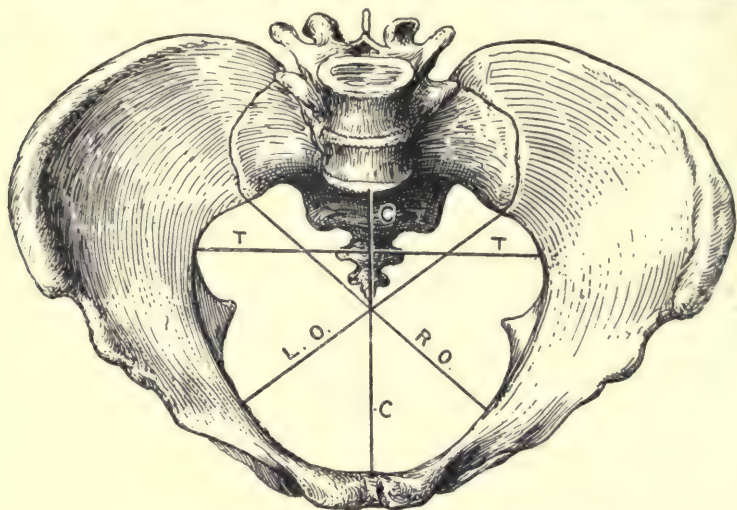


FIG. 73. The pelvic inlet. T, transverse diameter; L.O. and R.O., left and right oblique diameters; C, true conjugate diameter.

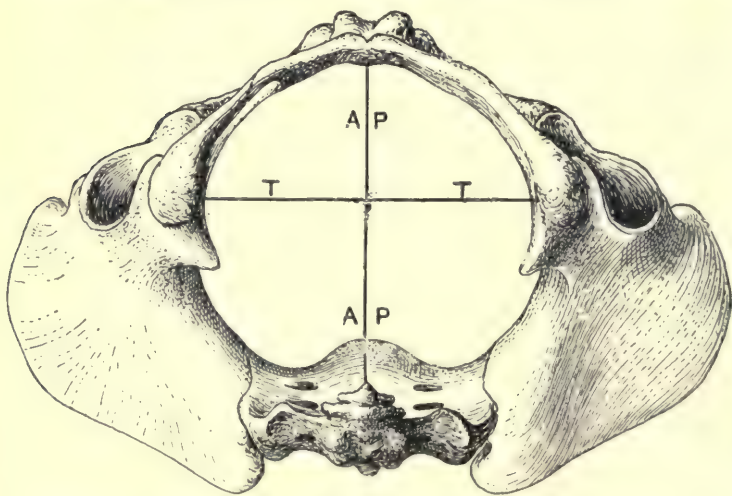


FIG. 74. Pelvic outlet. T, transverse diameter; A.P., antero-posterior diameter.

oblique, owing to the encroachment of the big muscles of the iliac fossa.

In the centre of the pelvic canal the measurements are practically unimportant, for obstruction occurs either at the inlet or outlet, but not in the cavity.

At the outlet the measurements are—

1. Antero-posterior from the tip of the coccyx, which is pushed back with the descent of the head, to the middle of the lower border of the symphysis pubis—5 inches (Parvin).

2. Oblique—there are no bony points in the oblique diameter and therefore it has no practical importance.

3. Transverse from the inner border of one ischial tuberosity to the inner border of the other—4½ inches.

	Inlet.	Outlet.
Antero-posterior	4½ inches	5 inches
Oblique	5 inches	—
Transverse	5 inches	4½ inches

Foetal skull. The vault of the skull consists of the parietal, occipital, and frontal bones, separated from each other by membranous sutures and spaces. The spaces occur where three or more sutures meet and are called fontanelles. The frontal suture separates the frontal bones. The coronal suture separates the frontal and parietal bones. The sagittal suture separates the parietal bones. The lambdoidal suture separates the occiput from the parietal bones. The anterior or large fontanelle is lozenge-shaped, and is formed by the junction of the sagittal, frontal and coronal sutures. The posterior or small fontanelle is triangular and the meeting-place of the sagittal and lambdoidal sutures.

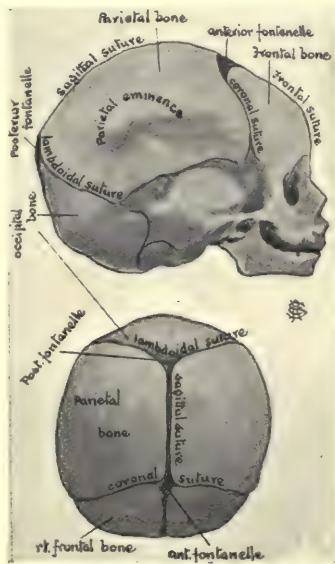


FIG. 75. The foetal skull.

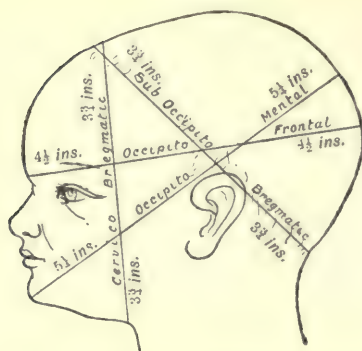


FIG. 76. Diameters of the foetal head.

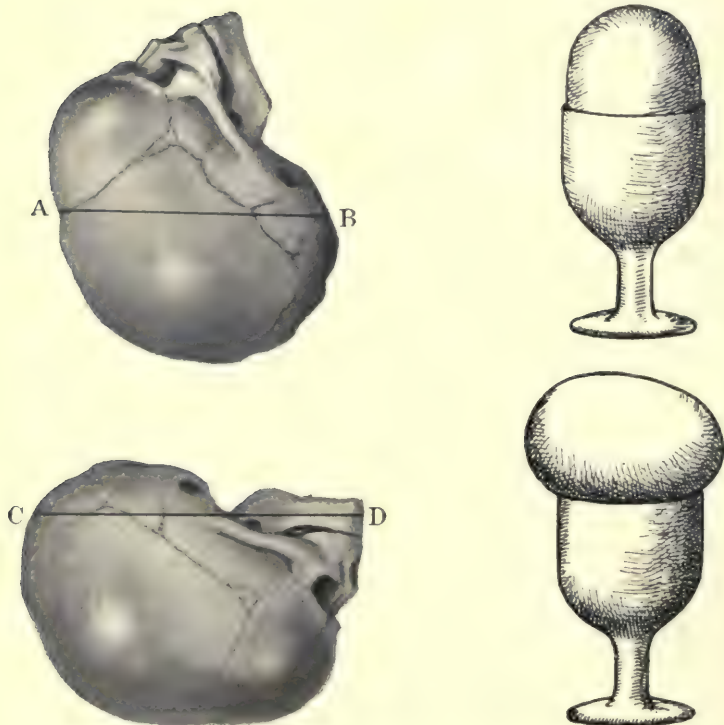


FIG. 77. Diagrams showing egg-shape of foetal head. A, B, Suboccipito-bregmatic diameter, which engages in vertex presentations. C, D, Occipito-mental diameter, which engages in brow presentations.

When the head is fully flexed, the suboccipito-bregmatic diameter, which is $3\frac{3}{4}$ inches, engages. In other words, the largest section of the foetal head that has to pass, has for one diameter the suboccipito-bregmatic diameter, which is $3\frac{3}{4}$ inches, and for the other diameter the bi-parietal diameter, which is also $3\frac{3}{4}$ inches. When the head is less flexed, the suboccipito-frontal diameter, which is 4 inches, engages; still less flexed, the occipito-frontal $4\frac{1}{2}$ inches; and neither flexed nor extended, the occipito-mental, which is $5\frac{1}{4}$ inches. But when the head becomes fully extended, the cervico-bregmatic diameter passes, which measures $3\frac{3}{4}$ inches. To all these sections, the bi-parietal diameter of $3\frac{3}{4}$ inches is common. The difference between a flexed head and a head between flexion and extension, as regards the ease of fitting into the brim, is much the same as the difference of the fit of an egg into an egg-cup, according as it is put in in the ordinary way or across the egg-cup.

What is learned from pelvic and foetal skull measurements. From these measurements it is evident that the longest diameter of the foetal skull will lie along one of the oblique diameters of a normal pelvis, for the oblique diameters are the largest diameters of the normal pelvic inlet. It is also evident that a fully flexed head has more chance of passing through the pelvic canal than has one that is less flexed. Thus, if it is a very tight squeeze for the head, the head will be fully flexed, and the presentation known as the posterior fontanelle will result. But the more roomy the pelvis, the less need is there for the foetal head to flex, and we have known a primipara deliver herself of a full-term child, whose head was neither flexed nor extended (brow), fifteen minutes after the full dilatation of the os. The question is therefore a relative one, but with an average pelvis and an average foetal head, it is necessary that the latter should be sufficiently flexed to allow the suboccipito-bregmatic diameter of $3\frac{3}{4}$ inches or suboccipito-frontal of 4 inches to be the largest diameter to pass the inlet of the pelvis. Less flexion than this, resulting in either anterior fontanelle presentation (occipito-frontal diameter $4\frac{1}{2}$ inches) or brow (occipito-mental diameter $5\frac{1}{4}$ inches), as a rule leads to diffi-

cult labour or the head fails altogether to pass the pelvic inlet. Full extension, on the other hand, resulting in face presentations (cervico-bregmatic diameter $3\frac{3}{4}$ inches), enables the head to pass readily through the normal pelvic inlet.

Looking again at the average measurements of the pelvic canal and outlet, we see that when once the foetal head has passed the brim, there is no narrowing of the pelvis, and therefore no reason why the head should not pass through the canal and pass the outlet in a normal case. So too, if

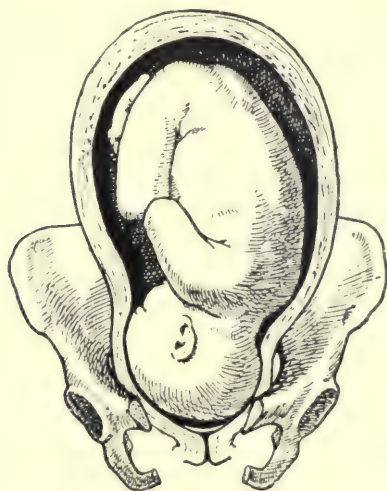


FIG. 78. Flexed head engaged in the pelvic brim.

a less flexed head passes the inlet without difficulty, it will as a rule be delivered without difficulty. Increased flexion may occur in the canal, but this only improves matters and allows a smaller diameter to pass; or a brow may flex or extend, and this, again, makes the passage of the head easier.

When the face passes the brim, the case is different. If the chin is in front against the pubes the cervico-bregmatic diameter $3\frac{3}{4}$ inches is the largest to pass, and all goes well. But if the chin points backwards and remains directed backwards, the neck enters the pelvic cavity with the head, and further progress becomes impossible (Fig. 80, p. 198).

Once again by comparing these measurements we learn that the longest diameter of the head, which at the pelvic inlet lies in the oblique diameter, for this is the longest diameter of the brim, will as it nears the outlet tend to lie in the antero-posterior diameter, for this is the longest diameter of the outlet. Rotation of the head then takes place during its passage through the pelvic canal. It is, in fact, a definite rule of the mechanism of labour—that *the most advanced part of the foetus, as it descends, is turned to the front by the levator ani and other structures that form the pelvic floor.*

Form restitution force and foetal axis pressure. When the membranes are ruptured, the contracting uterus, acting through its transverse fibres, straightens out the spinal column of the foetal body. The head is pressed into the brim and the breech is pressed against the fundus, causing it to rise, elongating the uterus. Thus, the contracting uterus becomes longer from above downwards. The shape of the uterus now greatly differs from that it assumed before the contraction occurred, and the attempt of the uterus to resume its natural shape adds a new expulsive force, *the form restitution force*, which is due to the elastic recoil of the elongated muscle fibres.

The force of the longitudinal muscle fibres acting on the breech of the straightened foetal body constitutes what is known as the *foetal axis pressure*. This causes descent of the presenting part.

We will now deal briefly with the different mechanisms.

The mechanism of vertex presentations. When the vertex presents, flexion of the head enables the smallest diameter to pass. The desired flexion is brought about—(1) because the part of the foetal head in front of the occipito-atlantal joint is longer than that posterior to the joint, (2) because the posterior slope of the head is greater than the anterior. Consequently, when the head is pushed downwards by the contractions of the uterus, the resistance of its progress acts with more force on the anterior part of the foetal head, because it is the long arm of the lever and its slope is less. The occiput therefore

advances more rapidly than the forehead and flexion results. The suboccipito-bregmatic or suboccipito-frontal diameter lies in one of the oblique diameters; and the sagittal suture lies in the same oblique diameter. As the head is pushed down (**Descent**) the os dilates, and this dilatation is caused mainly by the hydrostatic force of the bag of membranes, which is more and more forced through the os as it dilates. The os is aided in its dilatation by the arrangement of its muscular fibres, which are both circular

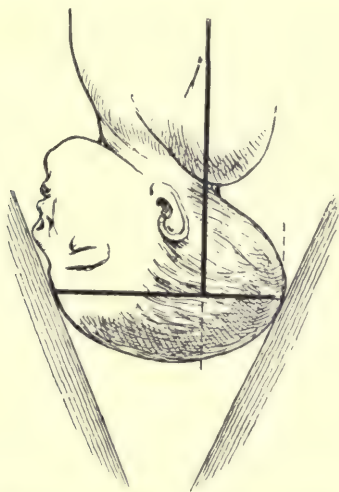


FIG. 79. Diagram to illustrate flexion of the head (due to the greater part of the head being anterior to the occipito-atlantal joint).

and longitudinal. While the latter contract the former relax. The lower uterine segment is expanded when the uterus contracts and this exercises a considerable lateral pull on the internal os at the beginning of labour. This expansion must take place during a contraction particularly, before the internal os is open, for the uterus closes on an incompressible water bag. The pelvic floor pushes the lowest part, the occiput, to the front, and the suboccipito-bregmatic comes to lie in the antero-posterior diameter (**Internal Rotation**). The occipital protuberance is against the pubic arch, and the flexed head extends and so is born

through the vulva (**Extension**). The head twists a little on the neck to perform internal rotation, and as soon as it is born the neck untwists (**Restitution**). The shoulders now lie in the other oblique diameter of the brim. As they descend, the anterior shoulder being lower strikes the pelvic floor first, is rotated to the front, and they, too, come to lie antero-posteriorly. The head outside the vulva follows their movement and turns a little more in the same direction as the jerk of Restitution (**External Rotation**). The anterior shoulder then fixes against the pubic arch and the posterior shoulder sweeps over the perineum and is born, or both shoulders pass the vulva at the same time. The trunk and body follow quickly. A description of the mechanism of labour cannot be complete without mentioning dilatation of the os, stretching of the lower uterine segment, rupture of the membranes and moulding, and lateral inclination of the head. These are referred to elsewhere.

The movements of the mechanism of normal labour are therefore (1) Flexion, (2) Dilatation of the Os with Descent, (3) Rotation of Occiput to the Front, (4) Extension, (5) Restitution, (6) External Rotation.

Occipito-posterior. When the occiput is posterior and flexion is partial the occiput remains posterior. With good flexion the occiput is the most advanced part of the foetus, and according to the rule is turned to the front by the muscles of the pelvic floor. But when flexion is partial, the forehead becomes relatively the most advanced part of the foetus. The forehead is actually higher than the occiput, but the pelvic floor is higher in front than behind, therefore the forehead strikes the pelvic floor first, and is rotated to the front. This partial flexion results in the occipito-frontal diameter ($4\frac{1}{2}$ inches) having to pass. The labour is, therefore, more difficult. The forehead fixes against the pubic arch, and by flexion the occiput passes over the perineum. The forehead then slips down and the head is born. The movements therefore are (1) Partial Flexion with Descent, (2) Rotation of Forehead to the Front, (3) Flexion, (4) Restitution, (5) External Rotation.

The mechanism of brow presentations. The brow may

be changed by flexion or extension to vertex or face before fixation. If neither flexion nor extension occur, the passage of the head in most cases is impossible. In a roomy pelvis it may pass as a brow. The movements are (1) Dilatation of the Os and Descent without Flexion or Extension, (2) Rotation of Brow and Face to the Front, (3) Birth of Head as a Brow by Flexion, (4) Restitution, (5) External Rotation. A few cases are on record, and we have seen one where a living child was born, naturally, and without difficulty in a primipara, with the chin behind. The soft parts were very extensively lacerated. The child weighed $6\frac{3}{4}$ lb. and the circumference of the head was 14 inches.



FIG. 80. Impacted face.

The mechanism of face presentations. The commonest cause of face is flattened pelvis, in which case the head enters the pelvic canal in the transverse diameter of the brim, for this is the longest diameter. The back of the head is wider than the front. When it is pushed down through the flattened inlet, the narrower anterior part of

the head (bi-temporal diameter $3\frac{1}{4}$ inches) passes more easily than the broader posterior part. Extension therefore takes place. The chin becomes the most advanced part of the foetus, and is pushed by the muscles of the pelvic floor to the front. It passes out under the pubic arch and the occiput sweeps over the perineum by flexion. The movements are (1) Extension, (2) Dilatation of the Os with Descent, (3) Rotation of Chin to the Front, (4) Flexion, (5) Restitution, (6) External Rotation.

Sometimes extension is not complete. The foetal forehead is then lower than the chin, and is pushed, in accordance with the rule, to the front. The chin points backwards. The neck and upper chest descend into the pelvic cavity and further progress becomes impossible without artificial aid.

The mechanism of breech presentations. The breech engages with the bi-trochanteric diameter in one or other oblique diameter of the pelvis and descends to the pelvic floor (**Descent**). The anterior buttock reaches the pelvic floor first and is rotated to the front (**Internal Rotation**). The shoulders do not participate in this movement and torsion of the child's body results. The bi-trochanteric diameter now lies in the antero-posterior diameter of the pelvic outlet. The buttocks are born by lateral flexion of the trunk (**Latero-Flexion**). The posterior buttock sweeps over the perineum and escapes at the vulva, then slips back slightly, to allow the anterior to come out beneath the symphysis. The bi-trochanteric diameter returns to its former relation with the bi-acromial diameter as a result of the untwisting of the foetal body (**Restitution**). Following this the shoulders descend in the oblique diameter of the pelvis, the anterior impinges on the pelvic floor first and rotates to the front. This movement is followed by the part of the body already born (**External Rotation**). The shoulders are then born as in vertex presentations.

The mechanism of the after-coming head of breech presentations. In nearly all cases the occiput is to the front, and the movements are (1) Flexion with Descent, (2) Rotation of Occiput to the Front, (3) Maintained Flexion

In the majority of cases this mechanism is brought about by artificial aid.

When the forehead is in front and persists so, the movements are (1) Partial Flexion with Descent, (2) Rotation of Forehead to the Front, (3) Maintained Flexion.

In rare cases the chin becomes caught at the top of the pubic bone and the head extends. The chin is fixed against the pubes, the occiput sweeps over the perineum, followed by the vertex, and the head is born.

Transverse presentations. Children that present transversely are not born without help, with rare exceptions. These exceptions are either when the contractions of the uterus turn the presentation into one of head or breech (**Spontaneous Version**), or when the child, being dead or premature, is expelled doubled up (**Corpore Condu-plicato**), or by **Spontaneous Evolution** of Douglas, in which one arm prolapses, the shoulder fixes under the pubes, the other shoulder, the trunk, and legs sweep over the perineum, and the after-coming head is delivered as in breech. But these cases are so rare, that from a practical point of view there is no mechanism to transverse presentations.

CHAPTER X

ABNORMALITIES CONNECTED WITH THE CHILD OR THE PRESENTATION OF THE CHILD

Occipito-posterior Presentations — Brow, Face, Breech, Transverse Presentations — Twins — Hydrocephalus, Anencephalus, Spina Bifida, Meningocele, Monsters— Foetuses of abnormal size—Impacted Shoulders—Prolapse of a Limb with the Head—Prolapse of the Cord.

THE management of abnormal labour will be given in four sections:—

1. Abnormalities connected with the child or the presentation of the child.
2. Abnormalities connected with the uterus.
3. Abnormalities connected with the pelvis.
4. Abnormalities connected with the third stage of labour.

OCCIPITO-POSTERIOR PRESENTATIONS

Frequency. Of the 13,511 deliveries, excluding abortions, in the Rotunda Hospital during the last seven years, we have had 130 cases of persistent occipito-posterior, or 1 in 104. This is a smaller proportion than in other clinics, and the only explanation we can find is that we give the cases time to rotate and do not put on forceps early. Thirty-one of these cases were delivered with forceps.

Cause. Two conditions are frequently associated with occipito-posterior presentations, namely, feeble uterine pains and damaged levator ani muscles, from a torn perineum or vaginal lacerations due to previous labours. The feeble pains produce insufficient flexion of the head, and the damaged levator ani fails to push the occiput to the front in Vertex III and IV, even if it is the lowest part of the foetus.

Course. In most cases of Vertex III or IV good contractions of the uterus push the child's head down, and with descent there is flexion. The occiput becomes the most advanced part of the foetus and gets pushed by the muscles of the pelvic floor to the front. The delivery is then the same as in Vertex I and II.

But, if the pains are feeble, only partial flexion results. The front part of the head is then relatively as low or lower than the occiput and is pushed to the front, or a damaged levator ani and the feeble pains fail to cause anterior rotation. We then get a permanent occipito-posterior presentation, and the head maintains its position when on the perineum or pelvic floor. Two things may happen: (1) The patient may be sent to sleep, good pains come on when she wakes, and the child is born either with or without rotation of the occiput to the front; (2) artificial aid is needed to effect delivery.

Diagnosis. By abdominal palpation, it is not hard, as a rule, to diagnose occipito-posterior positions. The breech is felt at the fundus, but, on tracing it downwards, instead of feeling the back the fingers dip into a hollow between the breech at the fundus and the head at the brim, and in this hollow the knobs of the limbs are felt. Limbs are always readily felt in these cases. You often feel the partial outline of the back along one flank. By Pawlik's grip the head is found fixed in the brim. Owing to the partial flexion the occiput and forehead are felt with equal ease. The characteristics of an occipito-posterior presentation then are the breech in the fundus, the head fixed in the pelvic brim, and a hollow between the two in which the outline of the limbs can be felt. The foetal heart is heard in the flank, but not as distinctly as in Vertex I and II. If the head has descended deep into the pelvis use the fourth grip to detect it.

Vaginal examination. We do not necessarily make a vaginal examination in these cases. To confirm by vaginal examination the diagnosis made by palpation, pass one or two fingers into the vagina and feel the vertex. Then feel for the sagittal suture running in the line of one or other

oblique diameter. Passing the fingers along this suture, feel the fontanelle near the sacrum. At the other end of



FIG. 81. Vertex III as felt by abdominal palpation.

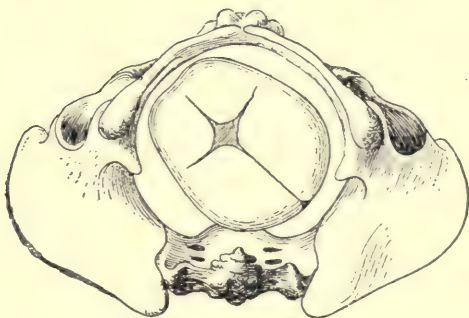


FIG. 82. Vertex IV as felt by vaginal examination.

the sagittal suture, near the pubes, is the anterior fontanelle. The anterior and posterior fontanelles can always be felt in these cases, when the head is fixed and the os sufficiently open. If the posterior fontanelle is behind and to the right,

the diagnosis is Vertex III; if behind and to the left, Vertex IV.

There is another feature discovered by vaginal examination that will sometimes first cause the suspicion of occipito-posterior to arise, namely, that the presenting head seems crowded to the front against the pubic arch and there is plenty of space between the head and sacrum.

Treatment. With the os fully dilated and the membranes ruptured, we do not attempt to turn the occiput to the front, either by twisting with the whole hand in the vagina or putting on forceps and twisting the child's head with them. We pay attention to the common cause of failure of flexion, namely, uterine inertia. If there is no uterine inertia, and the head is advancing with the pains, we leave the case alone. But in other cases, unless the mother has constitutional symptoms, such as pulse and temperature up to or above 100, or there are signs that the child is in distress, we give the mother a sleeping draught such as Chloral Hydrate gr. xx with Tr. Opii \mathfrak{m} xx in water, or Morphia gr. $\frac{1}{4}$ hypodermically, and leave her when she falls asleep, telling the nurse to send for us as soon as she awakens. In the hospital we use the following prescription:—

Sod. Bromid.

Chloral Hydrate a.a. gr. xv.

Tinct. Opii \mathfrak{m} xv.

Aquam q.s. ad $\bar{3}$ i.

Frequently when the patient awakes, she is refreshed and the pains are strong, the occiput rotates to the front and the child is born, or it may be born without rotation. It is surprising how low the head may be and yet rotation eventually take place. Pressure on the fundus with the pains materially assists. By this treatment the child is born whilst the uterus is in a good state of contraction and not in a condition of inertia. Retraction and contraction occur properly, and greatly diminish any risk of post-partum hæmorrhage. If, when the patient wakes, after a long second stage, the temperature and pulse of the mother begin to rise or the child shows signs of distress, then delivery must be completed by forceps.

Special points about forceps in occipito-posterior presentations. It is not difficult to apply forceps in these cases, nor have we found that they tend to slip. But, before applying them, make a careful examination with the half hand in the vagina.

If the head rotates during pulling, take off the forceps and reapply them, but when doing so get an assistant to press the head down in its rotated position, otherwise it slips back to its original position. This can be more easily done if the patient is turned on her back into the cross-bed position.

If it does not rotate, it does not matter much. Pull the head out slowly and carefully, making the occiput sweep over the perineum, by first pulling the occiput down and back until the perineum is stretched over it and then pulling more forwards and eventually directly forwards. The perineum is, of course, more likely to be torn owing to the large section (the occipito-frontal diameter $4\frac{1}{2}$ inches). that has to pass the outlet. The head has a tendency to slip out suddenly and cause extensive perineal laceration. Avoid this by lessening the traction as the occiput comes over the perineum.

BROW

Frequency. In the 13,511 deliveries there have been 18 brows, or 1 in 754.

Nature. In occipito-posterior presentations flexion is not complete. In brow presentations the foetal head is neither flexed nor extended, it is in a condition of balance between the two. It commonly becomes a face presentation, but sometimes a brow presentation persists as such. It is the rarest and most unfavourable of all head presentations. A section with the occipito-mental diameter $5\frac{1}{4}$ inches, the largest of all foetal head diameters, has to pass. Hence, except in cases where the pelvis is very roomy, or the foetus very small, interference is always necessary in cases of brow presentation.

Causes. Brow may be regarded as half-way to a face presentation and not infrequently becomes a face, therefore

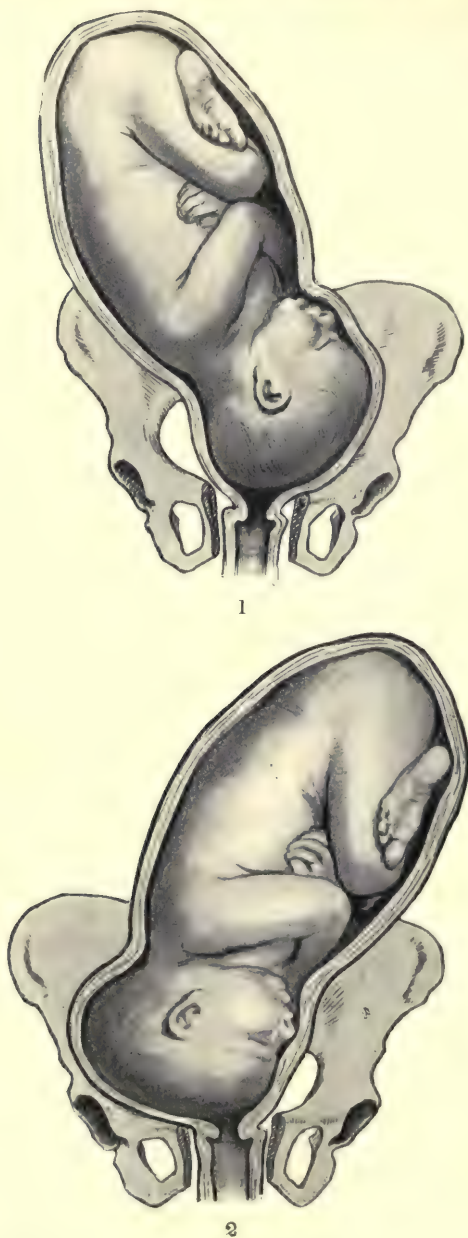


FIG. 83. Effect of obliquity of the uterus in producing extension.

the causes of brow are similar to those of face. They are in short anything that prevents complete flexion of the head and thus overcomes the lever and slope actions that produce flexion. They are—

1. The cord round the neck will sometimes prevent full flexion and favour extension.

2. A tumour of the neck acts similarly.

3. A dolicho-cephalic skull, which is longer behind than in front, reverses the normal lever action, which produces flexion.

None of these three are common causes and none of them have any practical importance, for they cannot be diagnosed in time to prevent a brow or face presentation occurring.

More frequent and practically important causes are—

4. Obliquity of the uterus, either lateral or forward, evidenced in the latter case by a pendulous abdomen. Owing to the slope of the uterus either the back of the head or the face of the child lies over the pelvic brim, according as the foetus looks away from the deflected uterus or towards it. If the face lies over the pelvic inlet, the contracting uterus tends to push it down into the brim. A lesser degree of this will produce a brow (Fig. 83, 2).

5. Flattened pelvis. In flattened pelvis, the transverse diameter of the brim is the longest. The sagittal suture, which corresponds to the longest diameter of the foetal head, consequently also lies transversely. The head has to squeeze through this flattened pelvic inlet. The back of the head is wider than the front (bi-parietal diameter, $3\frac{3}{4}$ inches; bi-temporal, $3\frac{1}{4}$ inches), and hence the front advances more readily than the back, and a face or a brow presentation results.

Diagnosis. Brow presentation should be diagnosed by abdominal palpation, but the diagnosis should always be confirmed by the vaginal examination.

Abdominal palpation. Notice first the appearance of the uterus. It may look larger than normal and bulged to one side. This is only suggestive, not diagnostic. The breech at the fundus and the position and direction of the back and limbs are felt by the umbilical and fundal grips.

Pawlik's grip is the one that gives most information. The head does not fit into the brim, therefore you will find a large head, which can be moved from side to side, when the uterus is not contracting. This alone will indicate something wrong, for if the woman is in labour, the head should normally be held by the lower uterine segment and you should not be able to make it ballotte between the pains. The head is above the brim. The absence of flexion or extension causes it to be felt equally well and on the same level on both sides. The sharp chin and the great width between the fingers and thumb when grasping the upper limit of the head, before they sink into the groove of the neck, suggest the probability of a brow presentation. But in all abdominal palpations the ease with which the foetal parts are felt depends largely on practice, on the state of the patient's abdominal wall, and her nervousness. If, as in rare cases of big pelvis, the head is fixed and descended, even though the case is one of brow, there is no cause for anxiety.

Vaginal examination. Make a vaginal examination first with one or two fingers during a pain. The head is not held by the lower uterine segment and therefore the forewaters and afterwaters communicate. The consequence of this is that the extra weight of the waters compressed by a uterine contraction makes the membranes bulge down through the os like a sausage. Be careful not to press on them, for the unsupported membranes are liable to rupture early and easily. *This sausage-shaped bag of membranes is another sign that something is preventing the presenting part from fixing or being grasped by the lower uterine segment.* When the pain has passed off, feel the os and discover how much the cervical canal has opened and been taken up. The third sign that the head is not held by the lower uterine segment is the extreme difficulty or impossibility of reaching the presenting part; also that the cervical canal, though to some extent dilated and dilatable, is empty and hangs down like a curtain from the vault of the vagina. These three signs then go together and show that the presenting part is not grasped by the lower uterine segment: (1) ballotting of

presenting part, (2) sausage-shaped bag of membranes, (3) difficulty in reaching presenting part per vaginam.

If the presenting part cannot be reached properly. We advise lubricating the glove well with soap, washing off the outer and possibly dirty surface of the soap first, and passing

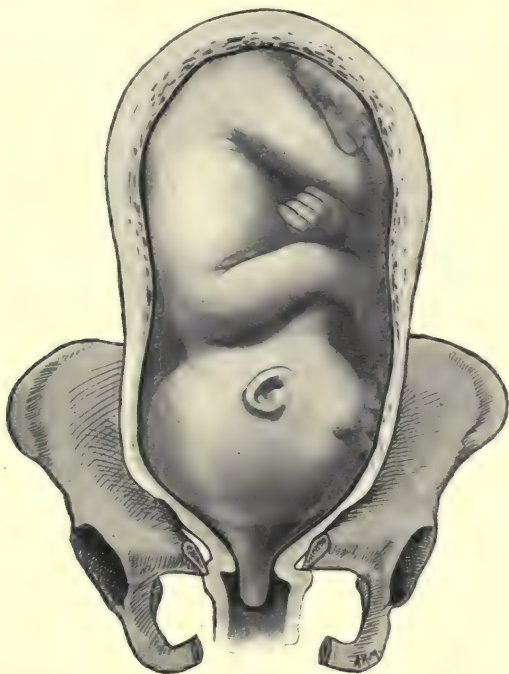


FIG. 84. Diagram to show bulging membranes due to non-fixation of the head.

a whole or half hand into the vagina. You will then be able to reach the head. Examine it only between the pains. The points upon which to make the diagnosis of brow are: (1) Locate the anterior fontanelle. (2) Feel the brow, the bony ridges of the eyebrows, and the bridge of the nose. Gather, too, some information as to the size of the pelvis, if she is a primigravida. (*See Contracted pelvis.*)

Cases in which the brow has descended into the brim. The brow may be then somewhat masked by a large caput,

and very probably the membranes will be ruptured. You can, of course, reach the foetal head easily. By careful and precise examination locate the anterior fontanelle, the brow, the orbicular ridges, the bridge of the nose, and press gently over the eyes. During a pain keep a finger pressed against a bony part of the head, and notice whether it advances at all with the pain. When the pain has passed, try to push the head up to see whether it is tightly and immovably jammed.



FIG. 85. Brow ^{III} IV as felt by vaginal examination.

Treatment:

Brow has been diagnosed by abdominal palpation, the head not fixed, and the membranes unruptured. Try to convert it by external version into a vertex.

Converting a brow to a vertex presentation by external version. Stand by or sit on the edge of the patient's bed as if going to undertake the fourth or pelvic abdominal grip. Raise the shoulders of the child as high as possible towards the fundus. Place the fingers of one hand on the chest of the foetus and the fingers of the other hand over the occiput. Push the chest in the direction of the child's back and the occiput in the opposite direction, increasing the flexion of the back and head. If successful push the head into the pelvic brim, and keep it in this position while the nurse puts on a tight binder, pinning it from above down. Then make a vaginal examination to see that the

vertex is presenting. We have found this treatment quite successful, and no harm can ever result from trying it.

Brow is diagnosed with the half or whole hand in the vagina, the membranes are unruptured. Again try to change the brow into a vertex *if the head is not fixed*. To do so, put the patient in the cross-bed position, and between the pains with your fingers in the vagina press the forehead upwards, and with the other hand on the abdomen, press the occiput down. If successful, keep the head in position whilst the nurse puts on a binder, and make sure by a vaginal examination that the vertex presentation is maintained. *If the head is fixed*, again get the patient into the cross-bed position, and try to push up the vertex, and bring down the chin, for a face presentation is much safer than a brow.

The position of the woman. After changing the brow to a vertex, and whilst waiting for the os to dilate, let the patient lie in bed on the opposite side to the obliquity of her uterus. If she has a pendulous abdomen, put on a tight binder. This tends to overcome the disadvantages of oblique uterus.

If the brow cannot be changed, and the membranes are unruptured, wait, keeping the patient in bed, until the membranes are ruptured.

When the membranes rupture, and the head is not fixed. Two fingers can always be passed through the os, and there is not the same fear of tearing the sodden os as in placenta praevia. Turn the child by bipolar version between the pains. If the os admits the whole or half hand without force, catch hold of a leg and pull it down between the pains. Tie a piece of gauze round the ankle, and leave the case to nature.

The prognosis both for mother and child is far better with breech than with brow. The case is now one of breech.

The membranes are ruptured, the os not fully dilated, the head above the brim. Everything now depends on whether the uterus is or is not approaching the condition known as tonic contraction. In this condition the uterus fits tightly round the child, the pains succeed one another with intervals of a minute or less; there is never

complete relaxation between the pains in which you can feel the foetal parts. Bandl's ring is prominent and nearing the umbilicus (remember the rule to pass a catheter before any of these manœuvres and examinations), the mother is in distress from the severe pains, and her temperature and pulse are both raised above normal. Rupture of the uterus is threatening. Put her in the cross-bed position, and under chloroform relax the uterus, or, at any rate, lessen the pains. Perforate the child's head, and deliver if it is dead. If not, try forceps tentatively; if this fail, perform pubiotomy. If the condition of tonic contraction is not threatening, turn and bring down a leg between the pains under chloroform if the pelvis is not too small.

The head is fixed in the brim and advancing with the pains, and neither mother nor child show signs of distress. Leave the case. The head will mould. But wait in the



FIG. 86. Moulding of brow delivery.

room. Carefully watch the mother's temperature and pulse, and if both rise to 100, deliver. Listen between the pains for the foetal heart. If it is under 120, or above 160, or there is a funic to-and-fro souffle, the child is in distress. If the child kicks violently, or if solid meconium comes away, the child is in distress.

If the head is fixed, and either mother or child show signs of distress. If the os is sufficiently open to put on forceps, well and good. Risk a tear. If it is not, dilate it under chloroform. Put on forceps and deliver. Failing to deliver, there are only two alternatives left:—

1. Perforate the child's head if it is dead.
2. Perform pubiotomy, symphysiotomy, or hysterotomy if the child is alive.

Moulding of the head. After birth the child's forehead, moulded by delivery, will be found to bulge, whereas the

vertex and back of the head are flattened. There will be a large caput over the brow.

FACE

When the head becomes more extended than a brow, full extension occurs, and a face presentation results.

Frequency. In 13,511 deliveries we had 23 cases of face, or 1 in 587.

Causes. The causes of extension leading to face are those that have already been fully described under brow, namely, (1) the cord round the neck, (2) a tumour of the neck, (3) a dolicho-cephalic skull, and commonly, (4) obliquity of the uterus, with either lateral or pendulous abdomen, (5) contracted pelvis, tumours, &c.

Course. If the chin is to the front or turns to the front, the child is, as a rule, born without difficulty. This occurs in the great majority of cases. But with partial extension and the chin posterior, the forehead first reaches the pelvic floor and turns to the front. The child descends, until the head, neck, and upper part of the chest are in the pelvic cavity. Further progress becomes impossible, unless strong pains succeed in increasing the extension, making the chin the most advanced part of the foetus, and so causing it to be turned to the front. If this does not happen, the natural delivery of a living child is practically impossible, although there are a few cases on record where it has occurred. Treatment will be directed towards rotation of the chin to the front. If this fails, pubiotomy or perforation is indicated, the choice depending on whether the child is alive or dead.

Diagnosis. A face presentation can in most cases be diagnosed by abdominal palpation, and we place great reliance upon this. But the rule to assist diagnosis in all difficult cases by a vaginal examination should be followed.

Abdominal examination. The appearance of the uterus suggests the presence of an abnormality.

The back is deeply hollowed by extension, and this gives the clue to palpation by the first and second grips. You find the breech at the fundus, and if the back is to the front



FIG. 87. Face I as felt by abdominal palpation.



FIG. 88. Face III as felt by abdominal palpation.

you feel the hollowed back with less ease than the partly flexed back of a normal vertex. On the other hand, if the back is behind, the chest and limbs are pushed forward against the anterior wall of the uterus, and are felt with peculiar ease. In the first case the foetal heart is heard with difficulty, in the second easily by listening over the foetal chest.

It is Pawlik's, or the fourth, grip that gives most help in diagnosis. If the head has not sunk into the pelvis, you feel by Pawlik's grip the prominent occiput as a round, hard mass on the same side as the back, and the chin with greater difficulty and at a lower level than the occiput on the opposite side. This is the reverse of a normal vertex, in which by Pawlik's grip the child's forehead is the more readily felt, and is the higher part of the foetal skull and on the opposite side to the back. The groove of the neck also runs obliquely, being higher on the side of the back than on the side of the chest, and makes a deep sulcus between the occiput and back.

If the child's head has sunk into the pelvis, use the fourth grip. The fingers are stopped by the prominent occiput on the same side as the back, but sink easily into the pelvis on the side of the child's neck and chin.

Vaginal examination. If the head is not grasped by the lower uterine segment, the cervical canal is empty and the

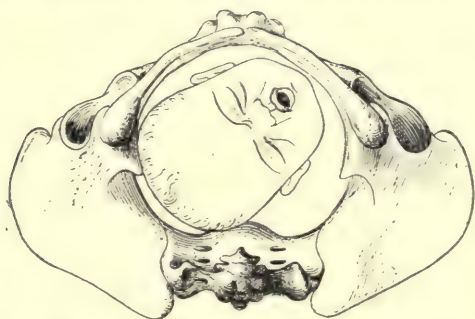


FIG. 89. Face I as felt by vaginal examination.

membranes protruding. In such a case, in order to be quite sure of the diagnosis, pass the whole or half hand

into the vagina. At the same time, in a primigravida or a multipara with a history of difficult labours, discover whether the case will have to be treated as one of contracted pelvis.

When the face has descended into the pelvis, it is obscured by a large caput and may be mistaken for a breech or a monstrosity.

To distinguish a face, between the pains put one finger carefully into the child's mouth and feel the ridges of the gums and the tongue. If the membranes have ruptured, feel more boldly. The ridges of the gums and the tongue are quite convincing. It is said to be necessary to distin-

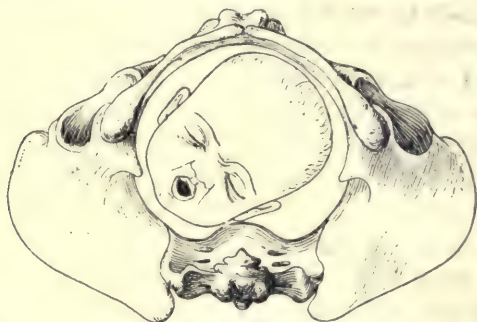


FIG. 90. Face III as felt by vaginal examination.

guish an anus, and this can be done by the fact that the finger is gripped by the sphincter ani, but is not by the lips. Also meconium may stain your finger. The lips may make a slight sucking movement, but we do not think this matters, for the chest is too tightly squeezed for the child to suck any mucus into its lungs.

Treatment:

The head is not fixed and the membranes unruptured. It is advisable to try to turn the face into a vertex by Schatz's method, although the large majority of face presentations are born without difficulty if left alone. We have ourselves several times turned a face into a vertex presentation by Schatz's method. As the conditions causing the presentation remain, the face presentation is apt to recur, and for the same reason, if the face is changed to

a brow, the brow will not remain but change into a vertex or back again to a face.

Schatz's method. Stand by, or sit on, the side of the bed as for the fourth grip of abdominal palpation. Lift the head out of the brim, with your fingers dipped down on either side between the head and the pelvis. Press the pro-



FIG. 91. Schatz's method of converting a face to a vertex.

minent chest of the child upwards and towards the back so that, by pressing the chest in, you press the back out, and so flex the hollowed back. With the fingers of the other hand press the occiput downwards and towards the middle line. When the chest has been pushed well in, press on the breech with one hand, keeping pressure on the chest

with the other. If successful in partly flexing the spinal column, pressure on the breech will increase this flexion, and this will also make the head flex. If the back is not flexed, pressure on the breech will make the chest bulge forward again. The best position of the child for this method is with the back looking to one side and the chest to the other. If the back is behind, the position is favourable for delivery as a face.

If Schatz's method succeeds, push the well-flexed head into the brim, and put on a tight binder to keep the child in this position.

If unable to change the presentation, let the case alone. Unless the pelvis is too small for the face to descend, *it will descend and dilate the os*, after the membranes have ruptured. If the face fails to descend and the head can be ballotted above the brim after rupture of the membranes, the case is from a practical point not one of face presentation but rather a case of contracted pelvis.

The face descends into the pelvis, the os is open, and the membranes have ruptured. Leave the case alone. If the chin is to the front, the child will be born naturally; if behind, it will in most cases rotate to the front. Should the chin be in front do not apply forceps until it is indicated by the condition of the mother or child. Forceps is not an ideal instrument for delivery in these cases, for it does not easily adapt itself to the face; the application is more difficult; it is more apt to slip, and it is said to cause deep inspiratory movements. In spite of these disadvantages we have successfully delivered several such cases.

The chin is behind and does not rotate to the front. The treatment depends on whether constitutional symptoms arise in the mother or if there are signs of foetal distress.

Constitutional signs and foetal distress signs are absent. If the reason that the chin does not rotate to the front seems to be partial extension with feeble pains, we give our patient morphine (gr. $\frac{1}{4}$) hypodermically, or tinct. opii (℥ xx) with chloral hydrate (gr. xx), or perhaps scopolamine (gr. $\frac{1}{120}$) with morphine (gr. $\frac{1}{8}$), and keep her on her side on which the chin is to favour forward rotation. When she is asleep,

we leave her, and go to her again when she awakes. The pains are often stronger when she wakes, and the stronger contractions increase the extension of the head; the chin becomes the most advanced part of the foetus and turns to the front.

As long as constitutional symptoms do not arise, we continue to wait for this to occur. We have waited as long as eight hours, and then have found a single pain bring about the desired rotation with delivery of the child, when the head was even on the perineum. You will hasten matters, however, if able to turn the child's chin forward. Put the patient in the cross-bed, and your whole hand in the vagina, and put your fingers along the most posterior side of the



FIG. 92. Moulding and caput of face delivery.

child's chin. Push the chin to the front by the shortest route, either at the beginning of a pain or between the pains. At the same time get the nurse to aid the rotation by external manipulation.

When constitutional signs arise. If the mother's pulse and temperature are rising, and the contractions of the uterus are tending to become tonic, what is to be done? The foetus is probably dead. Listen carefully for the foetal heart. If you have heard it before and cannot hear it now, or if rupture of the uterus is threatening, perforate the child's head through the forehead and deliver. If the child is alive, an operation for enlarging the pelvis is indicated. Perforation is unjustifiable.

As an alternative to the above treatment prophylactic

turning at an early stage of labour has been advised. We do not turn for face, but think it would be a justifiable course for the general practitioner meeting this condition complicating flattened pelvis.

When the child's head is born, the lips, eyes, and cheeks are swollen and blue from pressure, and the head and forehead are flattened. The child presents a very hideous appearance, which passes off in a few days. The shape of the skull alters more slowly.

BREECH

The breech may present with flexed or extended legs or with one flexed and the other extended.



FIG. 93. Breech with extended legs.



FIG. 94. Breech with flexed legs.

Frequency. In 13,511 deliveries we have had 359 breech or footlings, that is, 1 in 38.

Causes. Breech is not an accidental presentation, but arises from some abnormality of the uterus, pelvis, or foetus, which prevents the normal adaptation of the vertex to the lower uterine segment. Thus—

1. The large head of hydrocephalus sometimes cannot reach the lower uterine segment. It is therefore not fixed, and this will permit greater mobility of the foetus in the uterus.

2. Flattened pelvis will also prevent the vertex reaching the lower uterine segment.

3. Excess of liquor amnii causes the child to float and the vertex does not fix.

4. Twins alter the shape of the uterus, and may prevent fixation of the head.

5. Placenta praevia alters the capacity of the lower uterine segment and renders breech presentations more liable to occur.

6. Premature or dead children being small move about easily in the uterus, and with them breech is more common than normal.

7. In many cases a discoverable cause is not present.

An important cause in a primigravida is contracted pelvis. If the breech presents in a primigravida, it is always necessary to determine if it is a case of contracted pelvis.

It is not always desirable to change a breech presentation into a vertex. In flattened pelvis, hydrocephalus, presentation of the cord, and placenta praevia a breech presentation would be preferred. With these exceptions an effort should be made to change the breech to a vertex by external version. This can frequently be performed at and before the thirty-sixth week of pregnancy and sometimes later. When successful it may remain a vertex permanently or revert to its original position. This does not deter us from making the attempt.

Danger of breech presentations. The danger to the mother is not greater than that of a normal vertex. Rapid delivery of the child's head sometimes causes extensive lacerations of the perineum. But the danger to the child's life is considerable, especially when breech occurs in a primipara, or skilled assistance is not at hand. The child dies either because the cord is pressed on and its circulation stopped by the after-coming head, or because it takes an inspiration whilst the head is still in the pelvic cavity and sucks mucus and liquor amnii into its lungs.

Course. The breech does not fit the lower uterine segment so well as the head, hence the membranes protrude

and are apt to rupture early. The os then takes some time to open, for the breech does not dilate the os so well as the hard head. The rest of the course of a breech case is so intimately connected with treatment, that the two will be described together.

Diagnosis. The diagnosis of breech can frequently be made by abdominal palpation alone. Meconium coming away after rupture of the membranes suggests breech, but meconium comes away under other conditions. The foetal heart is heard best at or just below the level of the umbilicus, that is to say, higher than normal during the first stages of labour.

Abdominal palpation. By the first grip, the head and not the breech is found at the fundus. The head is distinguished from the breech by the fact that the head is separated from the back by the sulcus of the neck. Feel the part in the fundus, and run your hand from it down to the back. When the breech is at the fundus there is no groove felt when the hand is moved over the foetal back. If the child is lying with its side to the front of the abdominal wall, the groove of the groin might be mistaken for the neck, but the proximity of the limbs, which are always easily felt in such cases, prevents confusion. When the head is at the fundus there is a groove. Again, the head, forming an independent mass, separated from the back by the neck, can be moved from side to side freely between the pains. The breech can also be moved from side to side, but the whole back moves with it. Movement is, therefore, not so free. Whilst ballotting the part of the foetus in the fundus with one hand, feel the back with the other. You will be able to tell if the movement is imparted to the back or not.

These are the signs upon which to rely most in diagnosing that the head and not the breech is in the fundus. The head feels very hard, but in the absence of the other signs do not rely on this, for the breech may feel quite as hard as the head.

By the second grip, the fingers dip into the sulcus of the neck. You may also feel the knees or legs on one side, the back on the other. The movement of foetal limbs gives

the clue to the position of the child, for they are felt in the neighbourhood of the breech.

By Pawlik's grip you feel the resistant mass of the breech continuous with the child's back and miss the prominence of the forehead of a normal vertex.

The fourth grip is hardly necessary, but make it to be sure that the head is not sunk into the pelvic cavity, or that another head is not sunk into the pelvic cavity, in which case twins are present.

The necessity for a vaginal examination. If convinced of the diagnosis by abdominal palpation, a vaginal examination is not necessary, except when the waters break, when it should be made to see if the cord has prolapsed. The prolonged pressure of the breech on a prolapsed cord is better avoided by replacing it. In many cases, although the head is in the fundus, the breech may not have engaged. The case may be one of oblique lie. Therefore, unless the back runs straight down into the pelvis, make a vaginal examination.

Vaginal examination. Before the breech has been grasped by the lower uterine segment, two fingers will not reach the presenting part. The os is partially open and the bag of forewaters, not shut off from the afterwaters, bulges through the os. The cervix is empty and not taken up. These things indicate an abnormality, but not what particular abnormality it is.

To gain further information pass the whole or half gloved hand lubricated by soap gently into the vagina, and between the pains pass a finger through the cervix. If unable to diagnose the presenting part, wait until the os is more open. If the os is closed, leave the patient until definite signs of labour begin.

What is felt by vaginal examination. It is not unlikely that sometimes a breech will be mistaken for a head, for the breech feels very hard. The groove between the buttocks resembles a suture, but at a suture there is overriding of the bones, and a suture leads to a fontanelle.

Place most reliance on feeling the sacrum and its tubercles leading down to the coccyx. They are diagnostic of breech. Later, when the membranes have ruptured, a large caput may

obscure the outline of the breech, but the tubercles will be felt by pressing over the sacrum, and one finger can be passed into the anus. The sphincter ani grips the finger, and meconium may come away on it.

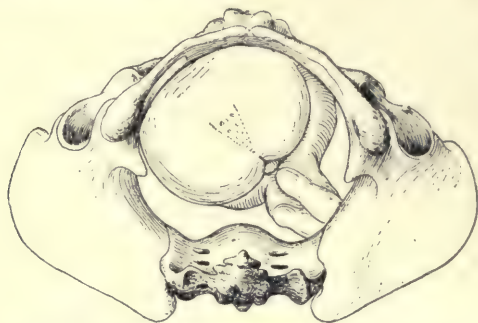


FIG. 95. Breech II as felt by vaginal examination.

Occasionally a foot presents, and this has to be distinguished from a hand. With two fingers this may be very difficult. The tips of the fingers lightly touch or brush over the foot, and the sensations conveyed by them are not sufficient to give a clear image to the mind. Do not be content

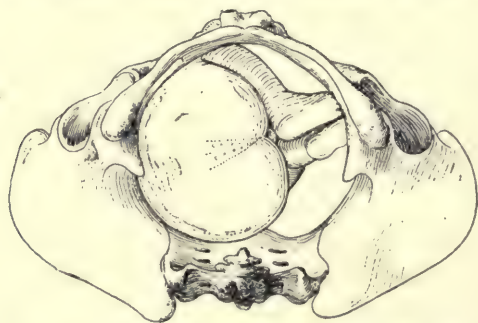


FIG. 96. Breech III as felt by vaginal examination.

with doubt. Pass the half hand into the vagina and the doubt whether foot or hand presents will be removed. The even level of the five toes differs from the four fingers and out-lying thumb. The thumb also has more movement than the great toe, but the greater movement of an infant's great toe, as compared to an adult's, makes this sign a little mis-

leading. The heel, however, is quite distinctive. When the membranes have ruptured, solid meconium comes away freely. This, which is a sign that the child's life is in danger when the head presents, is of no significance in breech.

Treatment :

Before the membranes rupture. Let the patient alone. Keep her in bed, for there is fear of premature rupture of the membranes if she walks about, and then the power the membranes have of dilating the os is lost.

If the unruptured membranes appear at the vulva and the os is fully open, rupture them.

The membranes are ruptured. Some recommend pulling down a foot to avoid the chance of impacted breech. We think this is unnecessary. The slow progress of the breech through the vagina is highly desirable, for the vagina thus becomes dilated and the aftercoming head will descend with greater ease. A hand or arm may be prolapsed at the side of the breech. This increases the dilatation of the vagina and is an advantage. Never bring down a leg and pull on it, for this is extremely likely to cause extension of the arms, and the head and extended arms together jam in the pelvic brim. Only when the head is small, as in premature children, is this expedient. The os, which does not dilate fully, tends to catch round the child's neck, and the extended arms prevent this.

When the breech appears at the vulva. Do not interfere until the breech presents at the vulva. When it does, support the perineum as in vertex presentations, and when the hips appear pass two fingers into the anterior groin of the child and deliver the anterior leg by gentle traction. Extract the posterior leg in a similar manner. It is better to do this than to let the legs flop out suddenly, for in so doing they may tear the stretched-out perineum. Deliver in the side position if possible. When the body is born the dorsal position may be more convenient.

When the child is born to the umbilicus. The room must be warm with a fire. Cold air on the breech tends to make the child inspire prematurely.

Take a loop of cord and pull it down. This prevents stretching of the cord and arrest of the circulation. At the same time the nurse is ready to press on the fundus.

If the cord is pulsating well, wait till the next pain, and, when the pain comes, the nurse presses strongly on the fundus, and the shoulders will be born.

If the cord is pulsating slowly, or is not pulsating, the child's head is probably compressing the cord and stopping its circulation. If the circulation through the cord stops for four minutes, the child will probably die.

The child must be delivered with speed. Its life depends on the speed and skill of delivery.

The first thing is to bring down the arms.

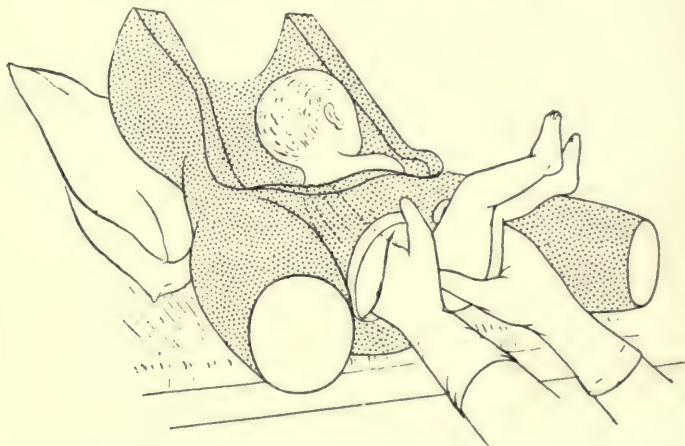


FIG. 97. Bringing down the posterior arm.

How to bring down the posterior arm. The breech will be born with one or other trochanter directed forwards. First bring down the posterior arm. Catch the child by the ankles with one hand and lift the breech up towards the mother's abdomen. Pass the whole or half gloved hand lubricated with soap into the vagina along the back of the foetus. The hand is along the child's back in the hollow of the sacrum. Pull the child's body downwards so as to bring the posterior arm within reach. Hook two or three fingers over the child's humerus down to the elbow. The

fingers evenly distribute the pressure over the child's arm and avoid breaking it. If the arm is extended, sweep it over the child's face, across its chest, and out at the vulva.

To get down the anterior arm. When endeavouring to pull down the anterior arm, carefully avoid pulling the child backwards against the perineum to too great an extent. A position that causes the child to lie in line with the mother's body is the most desirable one. Pass two or three fingers of the other hand between the pubes and the child, hook them over the child's arm and bring it down. If this fails, owing to want of room, make the anterior arm become posterior. To do this, grasp the body in both hands, push upwards to disengage the shoulders and pull the prolapsed arm over the child's chest outside the vulva, and twist the child round in the direction to which the prolapsed hand points. At the same time catch the child's pelvis with the other hand and twist it in the same direction. The anterior arm becomes posterior and is brought down as a posterior arm. If the child cannot be twisted round in this way, sometimes twisting it in the other direction succeeds.

What to do when one of the arms lies in the groove of the neck at the back of the head. Nuchal position. This is a serious difficulty. It is diagnosed by feeling the arm behind the head. Rotate the chest of the child towards the locked arm, thus freeing and then bringing it down.

Delivery of the head. The child is in danger and speed still essential. At this stage it is desirable to put the patient on her back.

Pass two fingers of one hand into the vagina and put them in the child's mouth well to the back of the tongue. Support the child's body on this forearm. Put the fingers of the other hand over the child's shoulders from the back. Pull the head down and, when the occiput is jammed against the pubic bone, continue to pull, but lift the shoulders and body up towards the mother's abdomen. If the head is not delivered, get the nurse at the same time to press down on the fundus of the uterus. If this does not succeed, direct her to press above the pubes directly on the head, or use one hand for pressure and continue to flex the

head with the fingers in the mouth. Pressure is necessary because the aftercoming head is in the lower uterine segment and vagina, and the uterus has, therefore, ceased to be an important factor in expulsion. In unaided deliveries the abdominal muscles supply the expulsive force.

If it fails, put on forceps in a similar manner to applying them to the forecoming head, and deliver. Many obste-



FIG. 98. Delivery of the head with fingers in the mouth.

tricians always have their forceps ready in cases of breech and deliver the head with them.

A third method of delivery, which is useful, is that known as the *Prague* method. Its value lies chiefly in the fact that it can be done quickly. Take the child's ankles with the right hand. Pull the child's head down as far as possible. Then put the fingers of your left hand on either side over the child's shoulders. The object is to flex the child's head by lifting the shoulders, which presses the occiput against the pubes, and so maintains and tends to increase flexion of the head. With the fingers hooked over the child's shoulders, lift and

pull them up, and at the same time carry the child's legs up towards the mother's abdomen. Whilst the occiput is fixed against the pubes, the face of the child sweeps over the perineum. The Prague method is much the same as the method already described, only the fingers are not put into

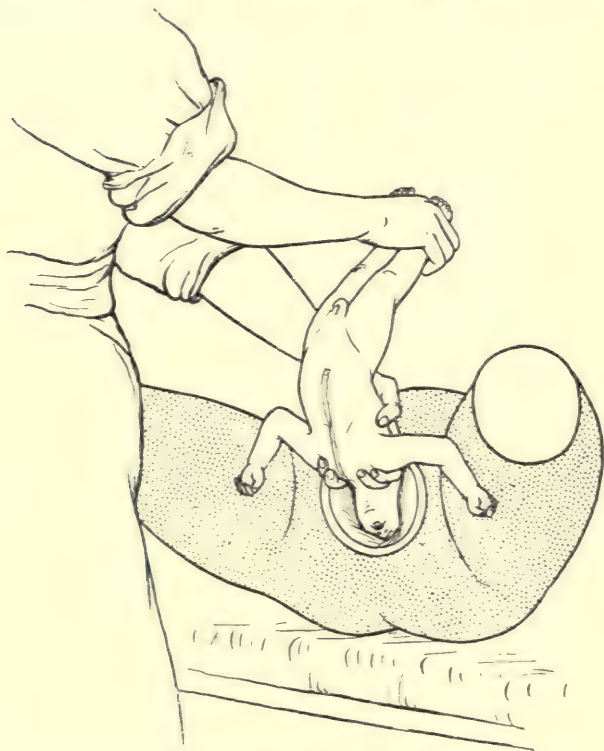


FIG. 99. Delivery of the head by the Prague method.

the mouth. The underlying principle of all methods is to cause flexion of the head.

The delivery of the aftercoming head at times involves the greatest difficulty and the expenditure of considerable muscular force. In such cases wind a strip of iodoform gauze around the shoulders and chest in the manner adopted by children in playing horse. This will give a hold which adds greatly to the available power. If traction and suprapubic pressure do not succeed in delivering the head, dis-

continue the attempt for ten to fifteen seconds. This gives the head a chance to mould, when delivery can usually be effected.

If the occiput is posterior. Twist the child, and the occiput becomes anterior. If this fails the Prague method will succeed in rolling out the head face to pubes.

If, owing to the flattened pelvis, the child's head lies transversely. It does not matter if the head comes down transversely, the occiput looking to one side of the pelvis and the face to the other. The occiput can be turned to the front, or it will turn itself during descent, and be delivered as before described.

Impacted breech. By impacted breech is meant a breech presentation which passes the pelvic brim, but becomes impacted in the pelvic cavity. The progress of the breech may be slow, but when it is impacted a large caput forms, the foetal heart between the pains is above 160 or below 120, the mother's pulse and temperature begin to rise, and the uterus tends to become tonic in contraction. The large caput and absence of any advance with the pains, detected by pressing on the breech with fingers in the vagina during a pain, call for help in delivery. An impacted breech has, of course, passed the pelvic inlet. If labour pains do not drive a breech past the pelvic inlet, the case is one of contracted pelvis.

Treatment. Pressing on the fundus with the pains aids the advance, but this is seldom sufficient.

One simple method of treatment is often effectual. Hook the forefinger of one hand over one or other foetal groin. Grasp the wrist of this hand with the other hand, and then pull with both arms. It is best to hook the finger into the anterior groin, but this is often impossible. If the finger is passed into the posterior groin the latter will rotate to the front as it descends. Pull with the pains, and at the same time get the nurse to press strongly on the fundus. The finger, however, soon tires. Then pass a fillet over one foetal groin.

Passing a fillet. The fillet we use is a long strip of iodoform gauze about six inches wide. There are two ways of passing it. Push a piece of wet gauze with your fingers up

between the child's thighs or outside one thigh, pass it over the groin, and pull it down with fingers or forceps. If there is no room to effect this, use a No. 12 or No. 14 male catheter. Push a doubled piece of silk up it by the stylet and pull a loop out of the eye of the catheter. Leave the stylet in and bend the end of the catheter to a hook. Pass the bent catheter up between the child's thighs, guiding it by a finger in the vagina. Turn the

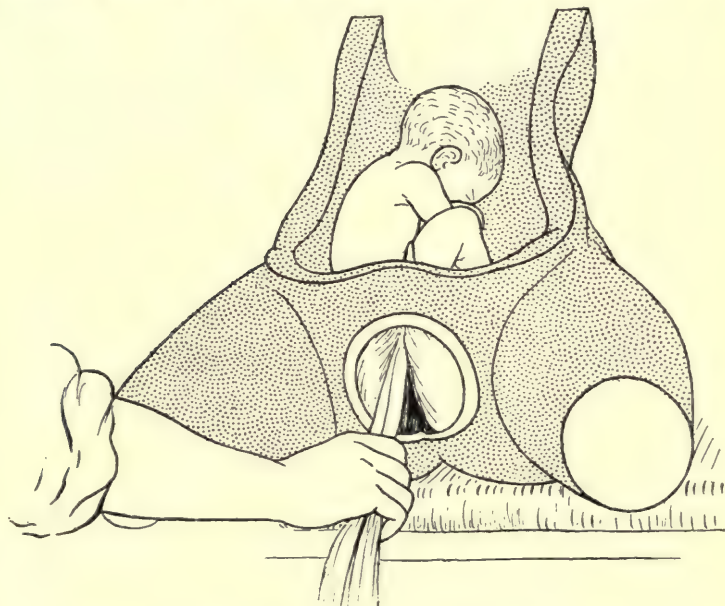


FIG. 100. The fillet in impacted breech.

hook over one or other of the thighs. Now slowly withdraw the stylet, keeping the catheter in position. Push the catheter further up. The convexity of the curve is in this way pressed over the child's groin. The bend increases and the tip of the catheter descends more and more down the outer side of the foetal thigh. Push your fingers up the outer side of the thigh to meet the catheter. Catch it and guide it out of the vulva, still pushing the stem up to allow the tip to progress. Tie a piece of iodoform gauze to the loop of silk and draw it to the eye of the catheter. Pull the gauze over the thigh by withdrawing the catheter.

There is now a piece of gauze passing over the thigh. Next push it well into the groin. This is essential, for, unless it is actually placed in the groove of the groin, it is extremely liable to break the thigh. Pull with the pains, whilst the nurse presses on the fundus. If the fillet is passed over the posterior groin, it becomes the most advanced part of the foetus and turns to the front according to rule. Pulling on the fillet with pressure on the fundus will deliver an impacted breech to the navel, and then the treatment becomes one of ordinary breech.

If the breech is impacted low down, a fillet can almost certainly be passed with the fingers alone. If the impaction takes place at or near the brim it is often impossible to pass a fillet. In such a case it is easy to bring down a leg. We have found this possible and easy even when the breech is quite low down near the perineum.

Our choice of methods is in the order given, though some operators believe that bringing down a leg is at all times the best method. Our only objection is that it seems to cause greater laceration of the vagina and perineum.

We advise against the use of blunt hooks. They are apt to fracture the thigh and tear the tissues of the groin.

CROSS-BIRTHS OR TRANSVERSE PRESENTATIONS

True transverse lies are rare ; more frequently the head is found either in one iliac fossa or to one side of the fundus—the lie is oblique.

Frequency. In 13,511 deliveries we have had 48 cross-births, or 1 in 280.

Causes. 1. An oblique uterus pushes the head into the iliac fossa of the opposite side.

2. Contracted pelvis favours cross-births and other malpresentations.

3. Hydramnios prevents fixation and favours malpresentations.

4. One or both twins may be transverse.

5. Premature or dead children move freely in the uterus, which predisposes to abnormal presentations.

6. Uterine tumours prevent the normal position of the child.

7. Placenta praevia prevents the head engaging, and a transverse lie may result.

8. The slack uterus of a multipara is less likely to maintain a foetus in its proper position than the firm uterus of a primigravida.

Course. The shoulder eventually gets pushed over the internal os and presents. The arm usually prolapses, therefore a prolapsed arm and the shoulder in the internal os is the presentation offered by a transverse lie, when the membranes have ruptured. Before this



FIG. 101. Transverse II.

occurs the shoulder, ribs, back, or abdomen may lie over the internal os. Natural delivery is impossible, except in the rare cases of dead or premature children, by a mechanism described under the heading of Mechanisms. Unless skilled help attends the mother, the child will not be delivered and the mother will die.

Diagnosis. The diagnosis is made by palpation and confirmed by vaginal examination.

Abdominal palpation. By Pawlik's grip no presenting part is felt in the brim, and this indicates some abnormality. By the fourth or pelvic grip the pelvic canal is felt to be empty.

It is necessary to determine the position of the head, and

this is often more difficult than discovering its absence from the brim. The head often lies in one or other iliac fossa, and the abdominal muscles over it, being sometimes stretched and hard, obscure its outline. The head is either in an iliac fossa or somewhere near the fundus, more rarely in one or other loin. It is distinguished in the same way as in breech presentation, namely, (1) by ballotting it separately from the back, (2) by the groove of the neck separating it from the back, (3) by its hardness and size.

Vaginal examination. Unless the arm is prolapsed, the fingers in the vagina cannot feel the presenting part. The unsupported membranes bulge with the pains and are very



FIG. 102. Transverse III.

liable to rupture early. In short, there are three warnings that something is wrong. It is very important to make an accurate diagnosis. Therefore put the half or whole hand into the vagina, giving chloroform, if necessary. Upon an exact determination of the lie depends the best success of treatment.

Usually the shoulder lies over the os. At first touch the shoulder may be mistaken for a sacrum or knee. But it can be distinguished by tracing the outline of the axilla and feeling the acromion process and spine of the scapula. The position of the scapula, whether anterior or posterior, determines the position of the back, and so the lie of the child. Recognition of the ribs is also characteristic.

Later an arm will often be found to be prolapsed. When the hand is in the vagina, there is no difficulty in distinguishing it from a foot. Grasping the hand, as in shaking hands, leads to the recognition of the position.

The importance of the lie is obvious. If the back is directed downwards and the limbs upwards, it is far more difficult to catch a leg than if the back is up towards the fundus and the limbs in the neighbourhood of the internal os.

Treatment:

Before rupture of the membranes when labour has only just begun. External version on lines similar to those recommended for a face presentation should be attempted. This will succeed only occasionally after labour has started. If it is successful it is sometimes impossible to keep the head fixed in the brim. No harm follows these manipulations even if they fail.

Always correct any obliquity of the uterus and keep the patient in bed.

Before rupture of the membranes. The os admits one or more fingers. Ascertain whether the case is one of contracted pelvis, in which case treat it according to the rules of contracted pelvis. But, if the woman has had live children born, or is a primigravida without contraction of the pelvis, either wait with her until the membranes rupture and then turn, or rupture the membranes and turn by bipolar version as soon as the os internum admits two fingers. The choice depends on the time at your disposal, but never leave such a patient without bringing down a leg.

The method of performing bipolar version has already been described under placenta praevia. The preparations and procedure are precisely the same. When a leg has been brought down and a strip of gauze tied round the ankle, it is safe to leave the patient in bed under the care of the nurse. Tell the latter to send when the pains begin to force the leg down. There is one great difference in turning in these cases and in placenta praevia. *In placenta praevia the lower uterine segment is sodden and eroded; in these cases it is not.*

If the hand is down, tie a piece of gauze round the wrist

before turning, to prevent its extension during the delivery of the aftercoming head.

The membranes have ruptured. Treatment then depends on whether all the liquor amnii has drained away and the uterus has contracted down on the foetus and made it immovable.

Put your whole hand into the vagina, with the patient in the cross-bed position and under chloroform. Ascertain the size of the os and the mobility of the foetus between the pains, and decide whether to attempt bipolar or internal version according to the size of the os. In a case where an attempt at version is unsuitable, something like the following will be found. The contraction or Bandl's ring rises up towards the umbilicus and grasps the child so firmly that without undue force you cannot get the fingers within the uterus between the ring and the foetus. Below the ring the uterus is large and ballooned, even feeling as large as the whole uterine cavity. These conditions warn you not to attempt version, and when less evident, not to use force when attempting version.

Other conditions of obstructed labour will also be present. The mother's pulse and temperature are above normal and are steadily rising. She is anxious and in pain. The uterus is hard and tender and does not relax between the pains. In extreme cases the mother's pulse is very rapid, her lips and tongue are dry, with sordes on her teeth, and she is evidently in great danger. Rupture of the uterus is threatening. The child will be dead. Listen for the foetal heart or feel for pulsations of the cord. If the foetal heart is still audible, rupture is not so imminent, and with the patient deeply under chloroform, you should be able to bring down a leg.

When rupture of the uterus is threatening. There is only one treatment, namely decapitation.

How to decapitate. Decapitation is not difficult. The instruments needed are (1) a Braun's hook, (2) a pair of stout scissors.

Braun's instrument is a blunt hook. Pass it up over the child's neck, guiding it by fingers in the vagina. The arm

is nearly always prolapsed in these cases, and pulling on the arm brings the neck nearer. By pulling and twisting the hook disarticulate the vertebrae. Pull the neck down by the hook and cut through it with scissors.



FIG. 103. Decapitation scissors.

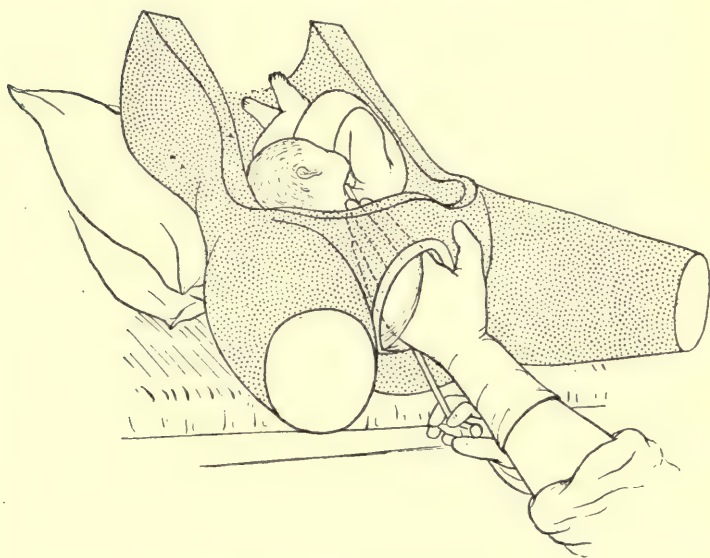


FIG. 104. Passing a Braun's hook.

Extract the child's body by pulling on the arm. If there is any difficulty, cut through the clavicle with the scissors.

To deliver the head, fix it in the brim by grasping it with bullet forceps or by getting the nurse to press it down into the brim by suprapubic pressure. Put on forceps. With traction, the brain matter is squeezed out through the severed spinal column, and the head collapses enough to come through with ease.

The necessity for crushing the head only occurs when the pelvis is contracted.

One more warning—let no one but the nurse see any part of the mangled child.

TWINS

Frequency. In 13,511 deliveries there have been 187 cases of twins, or 1 in 72.

They may arise from two ova within two Graafian follicles situated in one or both ovaries; or from two ova within one Graafian follicle; or from two germinal spots in one ovum. When the latter occurs the children are always of the same sex, have a common placenta and a common chorion, but separate amniotic sacs.

Presentations. Twins present in the following different ways, given in the order of frequency: (1) both heads; (2) one head, one breech; (3) both breech; (4) one head, one transverse; (5) one breech, one transverse; (6) both transverse.

Diagnosis. Twins are often difficult to diagnose. One foetus lies in front of the other and obscures it. Very often twins are not suspected until, after the birth of the first child, the uterus is still very large and contains a foetus.

The uterus is larger than normal. Twins are frequently born prematurely in the eighth or ninth lunar month of pregnancy.

The patient states that she is in labour, but that she is not up to her full time. On inspection the uterus is much broader and bigger than normal. The fundus is especially broad and may have fallen forward a little. There seems in short no more room in the abdomen. Its size suggests twins or hydramnios.

Abdominal palpation. The uterus is so full and stretched that abdominal palpation is often difficult. The most reliable sign given by abdominal palpation is the presence of three large foetal parts. In some cases more than these three large foetal parts can be made out. Sometimes it is possible to outline the lie and presentation of each foetus separately. If the line from the symphysis to the fundus

measured with callipers is more than twelve inches, twins should be suspected. By percussion during pregnancy a fluid thrill is usually felt. This will not be so readily perceived with twins shut off in separate amniotic cavities.

Foetal hearts. Twins are diagnosed if two foetal hearts of different rates are heard.

Listen for the foetal heart. Put an ink-mark where it is loudest. Then listen over the rest of the uterus. If there is another spot of loud foetal heart-sound, put an ink-mark over it. Now join the two lines. The sound, which is intense at one of the spots, will gradually decrease to the centre of this line, where it will be absent or almost absent. As you listen nearer and nearer to the other mark, the sound again gets louder and louder, until the other intense spot is reached. This is the best way of diagnosing two foetal hearts. It is useless to first count one heart and then the other and compare them, for the foetal heart-beat varies quickly with the contraction of the uterus, &c. It is more certain for two observers to count the different hearts at the same time.

Vaginal examination. By vaginal examination a prolapsed, pulseless cord may be felt. If this is associated with an audible foetal heart the diagnosis is established.

Course. Twins are usually born without difficulty. They are often premature and sometimes present abnormally. Locking of twins is an exceedingly rare complication. Post-partum haemorrhage is said to be more common after twins, owing to the stretching of the uterus.

The common order for the birth of twins is (1) the first child, (2) the second child, (3) the united placentae or the placenta of the first, (4) the placenta of the second.

Sometimes the placenta of the first child precedes the birth of the second child.

A further anomaly is sometimes found. One of the twins dies in utero, mummifies, and is crushed by the living foetus. The parchment-like foetus that results is known as a *foetus papyraceus*.

Treatment. Let the first child be born naturally, according to the rules of normal labour. Then palpate the

abdomen to discover the lie of the second child. It is often difficult to make a precise diagnosis, as loss of liquor amnii and thickening of the muscle make palpation unsatisfactory. Make a vaginal examination to confirm the palpation and to rupture the membranes. If this is not done hours, days, and even weeks may elapse before the child is born. If necessary rectify any malpresentation. Face and breech will be born without difficulty. The child is small and the parts already dilated by the first child.

If the second child does not descend quickly, press on the fundus with the pains and so help the uterus.



FIG. 105. Locked twins.

Remember always to divide the cord between two ligatures. If the funic circulations communicate in a placenta, the second twin may bleed to death through the severed but untied placental end of the funis of the first twin.

Locked twins. Twins may lock in two principal ways and cause obstructed labour. Such locking of twins is fortunately very uncommon.

1. When both heads are down, the second head may press into the neck of the first child and prevent its delivery.

Treatment. Anaesthetize the patient and introduce your whole hand into the vagina. Unlock the twins by pushing the head of the second child up into the uterus. If a hand is prolapsed, push it up, for by so doing unlocking may be facilitated. If you succeed, apply forceps and deliver. If you fail to push up the head, try forceps, and as a last resort perforate the first child, for it is more likely to be dead than the second.

2. The first child presents by the breech, but its head is jammed by the second child, lying transversely or longitudinally, and prevented from entering the brim.

Treatment. The patient being deeply anaesthetized,

with your whole hand try to free the head of the first child and pull it out. If this fails, the first child cannot be delivered alive. Perforate or decapitate it. Then deliver the second child and finally the head of the first child. These operations are exceedingly difficult. Perforation of the lower head is an easier method of delivery, but has the great disadvantage of destroying a living child.

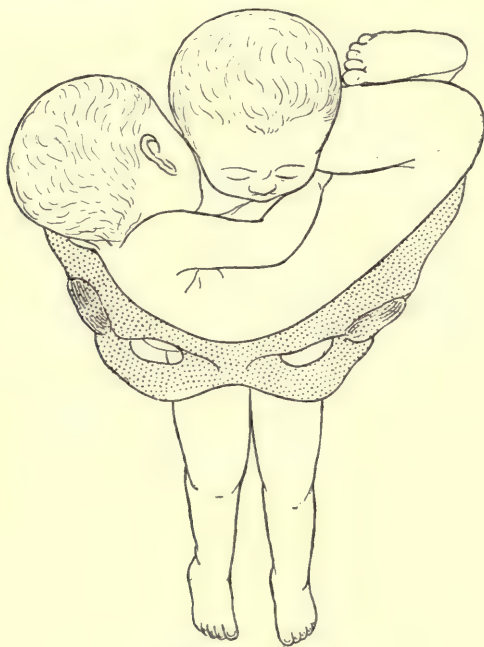


FIG. 106. Locked twins.

LABOUR WITH MALFORMED CHILDREN

Under this heading come (1) hydrocephalus, (2) anencephalus, (3) spina bifida and meningocele, (4) monsters, (5) foetuses of abnormal size, (6) abnormally large shoulders.

HYDROCEPHALUS

Frequency. Of 13,700 infants born, 12 had hydrocephalus, or 1 in 1,142.

Nature. When there is an excessive amount of cerebro-

spinal fluid, which is usually in the lateral ventricles of the brain, the cranium is stretched and enlarged. The condition is known as hydrocephalus. Its cause is not known.

The cranium above Reid's base line is formed of bone ossified from membrane. In the full-term foetus ossification is complete except at the sutures and fontanelles. When hydrocephalus exists, ossification fails to keep pace with the distension of the cranial membrane. Consequently the fontanelles and sutures of a hydrocephalic skull are far larger and wider than normal.



FIG. 107. Hydrocephalus. (Rotunda specimen.)

The fluid causing hydrocephalus may be enclosed in the cerebral membranes, but outside the brain, or it may be contained in the cavities of the ventricles—external and internal hydrocephalus. The latter is the more common form.

Course. The large head does not fit the lower uterine segment. Malpresentations are therefore common. Breech presentation is especially common and transverse not infrequent.

If the head lies over the brim there is especial liability to obstructed labour, leading to rupture of the uterus. The head does not mould to the pelvic brim, but tends to flatten out when forced downwards by the pains. Obstructed labour results. The lower uterine segment is stretched over the

large head, and this combined with the tugging of the upper muscular segment causes rupture of the lower segment.

If the breech presents, the prognosis is more favourable. The soft after-coming head is compressed as it passes the pelvic brim and canal and stretches out into a long cylinder, which passes almost as easily as a normal after-coming head.

Diagnosis :

By abdominal palpation an abnormally large head is felt.

Vaginal examination. The half hand may have to be used in order to reach the presenting head. In hydrocephalus the sutures and fontanelles are much larger than normal. So large are they that a fontanelle has been mistaken for the membranes. Distinguish between the two by being able to move the membranes over the foetal bones. Our suspicions of hydrocephalus are aroused when obstructed labour occurs with a vertex presentation in a woman who has given birth to full-time living children.

Treatment :

Before signs of obstructed labour. If hydrocephalus is diagnosed with the vertex presenting, turn the child and bring down a leg. The head is more easily delivered as an after-coming, than as a fore-coming head. If the diagnosis of hydrocephalus is wrong no great harm is done.

If the after-coming head cannot be delivered, it is often difficult to reach it with the perforator. Cut with scissors into the cervical vertebrae, and run a gum elastic catheter up the spinal column into the skull. The cerebro-spinal fluid escapes through the catheter, and the shrunken head can then be delivered.

After signs of obstructed labour have arisen. By combined vaginal and abdominal examination the vertex may be found on the perineum, while the face will reach almost to the umbilicus. Do not wait for the signs of obstructed labour to become marked, for, as has been already noted, the lower uterine segment is especially liable to rupture. Perforate the head, if a vertex, or draw off the fluid with a trocar and cannula. If the shoulder or breech presents, treat according to the rules for these. It is better to perforate a hydrocephalic skull, than to subject the mother

to risk. A child with hydrocephalus has not the same vital value as a normal one. It will probably die within a few months, and if it lives it is liable to become an unsightly imbecile.

ANENCEPHALUS

Frequency. Of 13,700 infants, 19 were anencephalic, or 1 in 721.

Nature. Anencephalus is thought to be a later stage of hydrocephalus. The stretched vault of the latter bursts and absorbs, and the vaultless head of anencephalus results.



FIG. 108. Anencephalus. (Rotunda specimen.)

Course. No difficulty occurs in delivery, except sometimes from the large shoulders. The difficulty of anencephalus is in diagnosis. Anencephalic foetuses are either stillborn or die quite soon. Other foetal abnormalities and hydramnios are often associated with anencephalus.

Diagnosis. Follow the rule of putting the half hand into the vagina when the diagnosis is doubtful, and feel the ears, face, and vaultless skull. The head descends rapidly, so that there is no cause for anxiety. If puzzled, wait till the head is easily reached.

Treatment. The only difficulties are cross-birth or impacted shoulders. Turn a cross-birth and bring down a leg. When the head is born and the shoulders become impacted,

cut through the clavicles with stout scissors. This frees the shoulders.

SPINA BIFIDA. MENINGOCELE

Spina bifida is a hernial protrusion of the membranes of the cord through undeveloped vertebral arches. It may occur in the dorsal, lumbar, or sacral region, or it may protrude, inward towards the abdominal cavity. The nearer the tumour is to the sacrum the less serious is the condition. These tumours are at times well covered by skin, but more often the latter is very thin and the bluish-red sac appears on the point of rupture. The nerve tissue of the cord may be spread over and intimately associated with the sac, which has a great tendency to ulcerate. If it does the child nearly always dies from loss of cerebro-spinal fluid or infection.

The diagnosis of spina bifida is made before delivery by inserting the whole hand into the vagina and carefully noting the position from which the tumour arises.

Meningocele is a hernia of the membranes of the brain, just as spina bifida is one of the membranes of the cord, If the hernia contains brain matter it is known as encephalocele. Neither is likely to give rise to obstruction in labour.

MONSTERS

Frequency. Of 13,700 children, there were three monsters; 1 in 4,566.

Nature. Monsters are either single or double. The first rarely give rise to any difficulty, for they are usually small and ill-developed.

Double monsters are more likely to give trouble.

They are either two fetuses loosely joined, two closely joined, or a monster with two heads and two legs or one head and four legs. They do not by any means necessarily cause difficult labour, but, being small, are usually born without difficulty.

Diagnosis. Make the diagnosis by putting the whole hand into the uterus when the patient is under chloroform.

Treatment. When the diagnosis of double monster is

made, pull down one leg. If delivery cannot then be accomplished, amputation of the limbs or other mutilating operations must be performed.

FOETUSES OF ABNORMAL SIZE

The foetus may have ascites, hydrothorax, cystic kidneys, a very large bladder, cystic hygroma of the neck, or other tumours which obstruct delivery. A general dropsy may cause the foetus to be of abnormal size.

Diagnosis. Diagnosis can only be made by putting the whole hand into the uterus. You are led to do this by finding that the head or legs enter the pelvic cavity, but progress ceases. Put the patient under chloroform, and insert the whole hand into the uterus to find out what is preventing the rest of the foetus from passing the brim.

Treatment. There is only one treatment if the child is dead, namely, to cut open the foetus with stout scissors, then pull the child down either by forceps or the legs, and cut again with scissors until the child is delivered.

IMPACTED SHOULDERS

The head is born, but the rest of the foetus does not follow. The shoulders are impacted. This often arises from failure of rotation of one shoulder to the front, due to premature pulling on the head. The attendant thinks the case is Vertex I, and as soon as the head is born he pulls on the head, and tries to twist it as it would turn in Vertex I. If the presentation is one of Vertex II, his efforts twist the shoulders the wrong way; they become transverse and impacted.

Treatment. Pass the half hand between the mother's sacrum and the child, and take hold of the posterior arm with as many fingers as possible, and bring the arm out of the vulva over the child's chest. If the anterior arm cannot be brought down, pull the delivered arm over the child's chest and twist the child a half circle. The anterior arm becomes posterior, and is delivered in the same way as the first arm. Sometimes twisting is easier if the child's head is pushed up towards the vagina, as this frees the anterior

shoulder. Traction on the head facilitates delivery of the arms. After the birth of the arms, the shoulders quickly follow.

If this fails resort to cleidotomy, or cutting through one and if necessary both clavicles with stout scissors, guiding them with two fingers in the vagina. Cleidotomy reduces the girth of the shoulders effectually. If the child is alive, cut the clavicle through near the scapular end so as to avoid injuring the large blood vessels.

PROLAPSE OF AN ARM WITH THE HEAD

By this is meant that a hand descends into the pelvis with the head.

Causes. It occurs sometimes with small children, such as one of twins or a premature child. In such cases it causes no difficulty in delivery.

But it also occurs when, owing to contracted pelvis, the head does pass through the pelvic brim to occupy the lower uterine segment, but leaves a space down which the hand comes at the side of the head. As a rule this is not a serious condition, but it may be the first indication of contracted pelvis.

Treatment. If any obstruction occurs, with the whole or half hand in the vagina push up the limb into the uterus. If it comes down and persistently obstructs labour, perform podalic version. Before version is performed, tie one end of a strip of gauze around the prolapsed wrist, which must be pulled outside the vulva. Before delivering the after-coming head, pulling on this gauze brings the arm down and prevents its extension.

Dorsal displacement of the arm behind the fore-coming head. We have not yet met this condition, and are sceptical about it as a cause of obstruction to the head's advance. We do not see how it would prevent the head fixing in the brim. When the head has fixed in the brim, forceps would deliver.

PROLAPSE OF THE CORD

Frequency. In 13,511 deliveries, there were 75 cases of prolapsed cord, or 1 in 180.

Nature. When the umbilical cord can be felt by vaginal examination through the unruptured membranes, the cord is said to *present*. If after the rupture of the membranes the cord comes down in front of or with the presenting part, the cord is *prolapsed*.

Causes. Prolapse of the cord is impossible if the lower uterine segment grasps the presenting part. Therefore the causes of prolapse of the cord are the same as those that lead to a communication of the afterwaters and forewaters, namely, that the presenting part does not accurately fit the lower uterine segment. The membranes bulge through the os. This bag bursts, much of the afterwaters rush out, they carry the cord, which was perhaps presenting, with them, and prolapse results.

We have dealt with several of these causes already, (1) brow, (2) face, (3) breech, (4) cross-births, (5) twins, (6) hydrocephalus, (7) hydramnios. Another cause which prevents the presenting part coming down to the lower uterine segment and so makes a prolapsed cord possible is (8) contracted pelvis, the commonest cause of all. The lower uterine segment is below the pelvic brim, and consequently, in contracted pelvis, the head not entering the brim fails to fill up the lower uterine segment. (9) Tumours preventing descent of the presenting part.

Danger. A prolapsed cord does not add to the risk of the mother, except the risk from the operative procedures necessary for rapid delivery. The head presses on the cord and stops its circulation. In breech cases, the breech does not compress the cord as dangerously as does a forecoming head, but prolonged pressure of the breech on the cord is injurious, and the cord should be replaced.

Of the 66 children, 39 were born alive. Of the dead children 3 were macerated. In 13 other cases the cord had stopped pulsating when discovered and no treatment was undertaken.

Diagnosis. When the cord prolapses it frequently appears at the vulva. At times it can only be diagnosed by vaginal examination. The importance of recognizing this condition is so great, that whenever the presenting part is not fixed a vaginal examination should be made to see

if the cord is prolapsed, immediately after the rupture of the membranes. When the cord is felt it cannot well be mistaken for anything else. Carefully notice if it is pulsating, and if it is, count the number of pulsations.

Treatment :

Before rupture of the membranes—presentation of the cord.

If the cord has come down to one side of the presenting part, get the patient to lie on the same side. The fundal pole of the foetus then falls over to the side on which the patient lies. The presenting pole swings a little in the opposite direction and so does not press on the cord. How much good this does one cannot say, but it is worth trying. Many writers advise bipolar version, on the ground that, if the cord prolapses, it is safer for the child to be born by breech than by vertex. We, as a rule, wait until the membranes rupture and the cord prolapses, as we find the cord can be replaced in the majority of instances.

After rupture of the membranes; prolapse of the cord. Take the cord between two fingers and feel if it is pulsating. If it is not pulsating, there is no good in replacing it. If it is pulsating, treatment depends on whether or not quick delivery by forceps or internal version is possible. The head must be fixed by its largest diameter in the brim and the os fully dilated to permit the use of forceps. The os should be at least three-quarters open before internal version and immediate extraction are undertaken.

Replacing the cord. The replacement of a prolapsed cord that has protruded through the vulva is, of course, attended with some danger of sepsis. Put the patient in the cross-bed position with a pillow under her buttocks. Chloroform, as a rule, is not essential. Pass the whole hand into the vagina and gather up as many loops of the cord as possible in the palm of your hand. Lift them up to the os and attempt to push the cord bit by bit past the presenting part. This method, in conjunction with the one to be described, very often results in successful replacement of the cord.

Pull a loop of cord out of the vulva. Take a No. 12 or No. 14 male catheter for a repositor. Push a loop of sterile silk through it with the stylet. Pull the loop out of the eye

of the catheter. Pass this loop round the cord and then pass it again into the upper niche of the eye-hole of the catheter and fix it there by pushing the stylet home through the loop. Draw the loop of silk tight enough to hold the

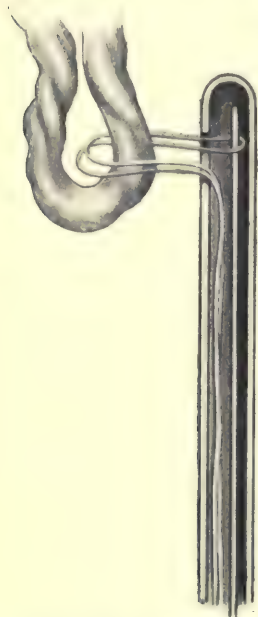


FIG. 109. Catheter and loop of silk, used as a repositor.

cord loosely, but not compress it. Guiding the catheter with fingers in the vagina, push the catheter into the uterus up to the fundus. This carries a considerable length of cord into the uterus, and then with your hand in the vagina hook any remaining part of the cord over the most prominent foetal parts. The nurse or an assistant pushes the presenting part down into the brim to occlude the passage through which the cord has slipped. Withdraw the stylet and then withdraw the catheter. This frees the cord. Do not remove the hand from the vagina until the catheter has been withdrawn. Feel that the presenting part has been pushed into the brim, and that the cord has not again prolapsed. Unfortunately, in some cases the cord again prolapses.

Some have, therefore, advised leaving the catheter in the

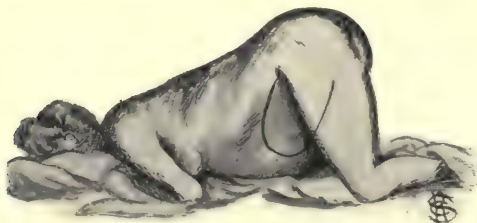


FIG. 110. Knee-chest position.

uterus, but practically this has been found to incur a great risk of strangulation of the cord in the loop of silk.

If the cord prolapses when released, replace once more by means of the repositor.

The knee-chest position is very useful while preparations for interference are in progress. The cord is relieved from the pressure of the presenting part. An alternative treatment to replacing the cord is version, bipolar or internal. The breech is much less likely than the head to cause fatal pressure. This treatment we also recommend. Indeed it is difficult to say whether reposition or version is the better treatment. If there is reason to apprehend contamination of the cord, version will certainly be preferable.

CHAPTER XI

ABNORMALITIES CONNECTED WITH THE UTERUS

**Non-dilating Os—Uterine Inertia—Precipitate Labour—
Labour with Malformed Uterus—Threatening Rupture,
and Rupture of the Uterus.**

NON-DILATING OS

Rigidity of the os. On rare occasions the os dilates with extreme slowness, or perhaps does not ever dilate fully.

The reasons for this are—

1. Early rupture of the membranes—the dilating power of the membranes is lost.

2. Scarring or other pathological defect of the cervix.

3. Probably in many of these cases the os is congenitally defective, so that even though stretched to its utmost capacity it cannot permit the passage of the head without tearing. It was formerly held that rigidity of the os was due to spasm of the circular muscular fibres, but this view is not now generally accepted, and cannot be true.

Course. These cases result in tedious labour. Several days may elapse and yet the os scarcely gets any bigger.

Treatment:

The non-dilating os. Patience is the only treatment. Make the patient sleep by giving chloral and opium. Chloral, especially, seems to favour the dilatation of the os, as also do copious hot vaginal douches. These have the effect of softening and loosening the fibrous tissue and allaying the acute pain of cervical dilatation, which sometimes inhibits proper uterine action.

The os that does not dilate because the membranes have ruptured before dilatation. In nearly all cases the presenting part of the foetus comes down and dilates the os. A

large caput forms. The first stage is often tedious, and may last some days. In spite of rupture of the membranes sufficient liquor amnii remains in the uterus to prevent disastrous consequences, provided the lower uterine segment closely fits the presenting part.

When the mother's pulse and temperature rise above 100 or the foetal heart indicates distress, the os should be opened artificially, either (1) manually, Harris's method is preferable as the usual method of manual dilatation is unsatisfactory, because it depends on the extensor muscles of the fingers, which are often unable to overcome the resistance of the cervix. With the whole hand in the vagina put the thumb and index finger through the cervix and use them with a movement similar in direction to that resulting from snapping the finger. This opens the os, and the second, third, and finally the little finger are successively inserted, and by strong flexion force open the os. The thumb is used to cause pressure in the opposite direction. Introducing the fingers of both hands into the cervical canal and opening the os by separating the hands has been advised. It is not to be recommended, and is seldom practicable, as the os is too far up. (2) By Champetier de Ribes' bag (see p. 144), (3) by Frommer's dilator (see p. 104) until the os is sufficiently open to permit the application of forceps. Further opening results from tearing and not dilatation. (4) The os can be opened by multiple incisions, but this has no advantage over letting the cervix tear. It is particularly in those cases where the os is thin and rigid, with knife-like edge, that multiple incisions have been advised. A long, blunt-pointed scissors is used, the fingers are placed on the cervix, and the incisions made preferably during a pain. The sharp cervical edge is nicked in three or four different places, corresponding to the positions of twelve, four, and eight, on the dial of a clock. If a fourth incision is necessary it is placed at six. Each nick should not extend further than half an inch. In the only case where we incised the cervix in this manner prolapse of the uterus developed subsequently.

Of these methods the bag is preferable. In fact, if, with

early rupture of the membranes, the os is scarcely any larger at the end of twenty-four hours than at the beginning, dilatation with de Ribes' bag is an efficient and satisfactory treatment.

Hot vaginal douches are also worth trying, for the heat softens the os and helps it to dilate. Similarly, sterile wool plugs soaked in boiled glycerine and pushed against the os for eight hours help to soften it.

UTERINE INERTIA

Uterine inertia is the name given to the failure of the uterus to expel the child in the average time, although there is no mechanical difficulty or obstruction to its passage present. This inertia, therefore, is attributed to the uterine muscle, which fails to act with its normal power and regularity. Uterine inertia is divided into primary and secondary.

Primary uterine inertia. Although the term primary uterine inertia should be devoted to the condition in which for some inherent reason the uterus fails to act and contract in the normal manner, yet it is also applied to the feebleness of a uterus that is induced by other conditions. These in themselves are without danger, but are able to interfere with the progress of labour owing to their inhibitive effect upon a uterus which is unduly sensitive. Such conditions are a full bladder or rectum, an overloaded stomach, sleeplessness, hunger, anxiety or nervousness in the presence of a doctor, and excessive sensibility to pain. That these conditions are the cause of interference with the regular and forcible action of the uterus is shown by experience, for by emptying the bladder or rectum, attending to conditions of indigestion, sleeplessness, or hunger, and by restoring the confidence and hope of a nervous woman, the uterus is, as it were, once more freed from the inhibitory tax that her condition has imposed upon it, and begins to act with the strength and regularity that is required for the normal progress of labour. Again, one must remember that, though for clinical purposes primary uterine inertia is separated from such conditions as malpresentations,

pelvic tumours, and contraction of the pelvis, it does not, of course, follow that combinations of the two conditions may not occur, and a case of obstructed labour be further aggravated by a condition of primary uterine inertia, resulting from full bladder or one of the causes given above. The fact that the cervical ganglia are not pressed on and stimulated by the presenting part is a cause of uterine inertia in obstructed labour. Similarly, too, the second kind of primary uterine inertia, which we are now going to describe, may be associated with other conditions of gravity, and add to the seriousness of a condition that in itself is often the cause of considerable anxiety to the obstetrician, of pain, worry, and dread to the patient, and of nervous sympathy and impatience on the part of her friends and relatives.

This condition is the primary uterine inertia that is due to inherent weakness or inefficiency of the uterus. A failure of the nervous mechanism can be given as a cause, although the nature of the nervous control of the uterus is little understood. We have then to deal with a condition in which for some inherent reason the uterus fails to contract with its normal force and regularity.

At first labour may set in and appear to proceed in a normal manner and bring about a partial dilatation of the os. This favourable progress then ceases, and labour will not advance further for hours, or even days. Indeed, it may actually retrograde, so that the os closes again, and the woman can once more pursue her usual occupations without danger for two or three weeks, when normal labour will eventually set in. More commonly, a condition of delayed and tedious labour sets in. The pains are feeble, and fail to make any definite effect upon the dilatation of the os or advance of the child. Frequently, too, the contractions of the uterus seem to cause the patient a considerable degree of pain, especially at the period when the os is dilating and the membranes separating from the lower uterine segment. She cries out and shows other signs of suffering. She demands chloroform as a relief, and her demands are often supported by the nurse and any female relatives who

are present in the room with her. A continuance of long intervals between the pains and a nervous alarm and weak resistance to the pains when they come eventually produces an atmosphere of dread and despair, which often casts a shadow of discredit and suspicion upon the medical man in attendance.

To end this state of nervous tension, which may continue for three or four days, the doctor is naturally tempted to give the woman chloroform, dilate the os, and deliver the child with forceps, a treatment, like others in which the judgment of the medical man is overcome by the unreasonable rebellion of his patient, that is very apt to be fraught with grave disaster. For we must assert with emphasis that, however irritating and annoying, the condition of primary uterine inertia is, if left alone, entirely without danger to the patient or the child. None of the danger symptoms of obstructed labour appear. Bandl's ring never forms, the pulse does not increase in frequency, and the temperature does not rise.

But if the case is interfered with artificially, the medical man is openly courting disaster. He is dragging a child from a feeble uterus, and a uterus in which the degree of retraction that seems necessary to control post-partum haemorrhage has not been attained. Violent flooding is apt to result, and retained placenta increases the shock and adds its dangers to the life of the patient, that is not imperilled if her petulant demands and those of her friends are wisely disregarded by the educated judgment of the doctor, to whom she has entrusted her welfare and her life.

Treatment. Having diagnosed the condition of primary uterine inertia (for the differential diagnosis between it and secondary uterine inertia see p. 258), you should first attend to the slight conditions that are apt to produce or aggravate her condition. Empty the bladder and the rectum, and, while preventing the stomach from being overloaded, see that the patient takes a sufficiency of food and drink. Procure for her rest by not allowing her to over-tire herself by vigorous attempts at bearing down or by

overwrought excitement when the pains are upon her. A full dose of morphia ($\frac{1}{2}$ gr.) is often effective in giving her a quiet and necessary sleep, from which she will awake with strong and regular labour pains. Chloral in doses of gr. xv is also often effective, but, remembering that the case may last three to four days, avoid pressing the effect of drugging. Rest in bed during the daytime often quiets the patient and introduces a more normal progress to labour.

Thus far we have been speaking of uterine inertia with unruptured membranes. Should the membranes be ruptured by injudicious treatment or some other cause while the os is still but partially opened, the case becomes more serious, not for the mother, but for the child. From such a uterus the liquor amnii will escape slowly as a rule, but that it will escape to an extent sufficient to endanger the child's life is proved by experience. From practical observation we find that foetal symptoms are apt to occur in cases where the os does not fully open within thirty-six hours after rupture of the membranes. After this time we advise you therefore to listen at frequent intervals to the foetal heart sounds, and if they show any marked and continuous increase, deliver rapidly, even at the cost of deeply tearing the cervix. If the foetal heart sounds become markedly slow between the pains, the time has probably passed for effective action, and we have not been successful in delivering such cases in a sufficiently short time to save the infant's life.

Other remedies that have been suggested for their oxytocic effect are quinine in doses of gr. v every four hours, and large quantities of carbohydrate (such as 1 oz. of treacle every two hours), and both strychnine and small doses of ergotin in subcutaneously have been used with success.

Other remedies that we can recommend are hot poultices or stupes to the loins and abdomen, and hot vaginal douches every four hours.

But in spite of this list of remedies, the main reliance must be placed on your power of giving confidence to the patient, of persuading her to patience, and of stopping

the assertions of the nurse that she is growing weak, and of the relatives that the child will never be born alive.

Finally, once more we must warn you from being persuaded into delivering the child artificially before the os is fully dilated, the membranes ruptured, and the child's head has been fixed in the brim for at least two hours, in which case the uterus, though feeble, has done needful work.

Secondary uterine inertia. Secondary uterine inertia is much rarer than the primary form. When it occurs, it is due to the drawing upwards of the contraction ring over the body of the child. The muscular portion of the uterus, with greatly shortened muscular fibres, is collected above the body of the child like a thickened cap, and its contraction becomes ineffective in expulsive force, for it occurs above the child instead of as normally around the child, by which it squeezes the child out, as the hand which grasps a piece of wet soap squeezes the slippery soap away.

Causes. The condition is consequent upon prolonged and obstructed labour, due to malpresentations of the foetus, contracted pelvis, or other obstructive hindrance to the normal delivery of the child.

Differential diagnosis between primary and secondary uterine inertia. Without the exercise of much care primary inertia may be easily confused with secondary inertia, the latter diagnosis being wrongly made when the pains appear to be less severe than in the earlier stages of labour.

This was supposed to be the result of 'tired-out uterus', but the introduction of scopolamine and morphia injections in the first stage of labour show that the condition is really one of 'tired-out woman'. The labour pains produce in a hypersensitive woman an hysterical condition of exaggeration and alarm which gives the appearance of powerful labour pains.

Later, the very excess of expression of the woman, proving as it does ineffective in producing the result she desires, namely the birth of the child, wearies her, and she ceases to apply herself to an unproductive exhibition of emotion. The labour pains, often feeble in such women, then appear in their true nature of comparative ineffectiveness. If,

in the excited period, morphia and scopolamine¹ injections are used, the patient becomes rested and often quietly falls asleep, from which she awakes with a calm mind and possibly no marked labour symptoms for some hours or even days.

Secondary uterine inertia, on the other hand, is accompanied by the signs of obstructed labour. Bandl's ring is dangerously high, the pains almost tetanic in nature, the abdomen is tender, the pulse is fast, the temperature raised, the mouth dry, and the patient is anxious and fearful.

Treatment of secondary uterine inertia. Deliver as soon as symptoms of obstruction appear.

PRECIPITATE LABOUR

Either true precipitate labour may occur, or the baby may be born unexpectedly, because the mother is insensitive to the labour pains. Another reason is the existence of a pelvis that is enlarged in all its diameters, the so-called justo-major pelvis. This occurs usually in giantesses, but sometimes in women of otherwise normal proportions.

Dangers. The dangers are chiefly to the child. If the mother is standing at the time the child will fall on the floor and may be killed, or it may die of haemorrhage from the ruptured cord.

The chief danger of true precipitate labour to the mother is that her perineum may get badly torn, although this is exceptional as the accident most frequently occurs in multiparae. Some writers say that inversion of the uterus and post-partum haemorrhage occur. But inversion does not occur unless the uterus is relaxed, and post-partum haemorrhage does not occur in a uterus that contracts strongly; therefore, without figures to prove these statements, we are sceptical of them.

Treatment. The patient is usually not seen until labour is over. If she has a history of previous precipitate labour, keep her in bed, and if the pains are very violent, control them with chloroform.

¹ See Appendix.

LABOUR WITH MALFORMED UTERUS

Pregnancy frequently occurs in a bicornuate uterus. In such cases one horn is well developed and the other is rudimentary. If the foetus lies in the former, pregnancy and labour are uneventful. If it lies in the latter, the case is clinically one of tubal pregnancy.

THREATENING RUPTURE, AND RUPTURE OF THE UTERUS

There are three varieties of rupture of the uterus: (1) that which is shown by statistics to be most common, namely, rupture preceded by warning signs and symptoms; (2) the quiet rupture, not preceded by warning signs and symptoms; (3) rupture following manipulations. We deal separately with them.

1. Rupture, preceded by the signs known as those of threatening rupture.

Causes. Anything which leads to obstructed labour may lead to rupture of the uterus. The chief are: (1) contracted pelvis; (2) malposition of the child, especially cross-births; (3) hydrocephalus; (4) obstruction by tumours. Pendulous abdomen is a cause of rupture of the uterus, which may or may not be preceded by warning signs, but this is an uncommon cause. The direction of the push of the uterus is backwards against the sacral promontory, and the head is usually the foetal part pushed against the promontory. The uterine wall between the bony head and sacrum gets pinched and crushed, and eventually is worn through or gives way from being too tightly stretched over the head.

Rupture of the uterus rarely occurs before rupture of the membranes. Indeed it could only occur before rupture of the membranes in women becoming pregnant after previous uterine rupture or Caesarean section.

Signs and symptoms of threatening rupture, with diagnosis.

Tonic contraction of the uterus. The uterine muscle, stimulated by the difficulty it encounters, puts forth greater and greater efforts. The pains last longer, are stronger and

more frequent, but are not expulsive in character. Relaxation between the pains is progressively less complete, and eventually the contractions of the uterine muscle become continuous or tonic. The uterus moulds itself to the child, but so tense is the muscle that the foetal parts cannot be felt. At the most, you can conjecture the lie of the child



FIG. 111. Diagram to show how pendulous abdomen tends to produce rupture of the uterus.

by the cast formed by the moulding uterus. The hard uterus is often *very tender*.

Bandl's ring also forms. Bandl's ring is the lower border of the retracting muscle of the upper muscular segment of the uterus, separating it from the stretched and thinned lower uterine segment. The more the thick muscular part of the uterus contracts and retracts, the higher this border becomes and the more the lower uterine segment is stretched. The height of Bandl's ring from the fundus indicates the

amount of retraction. The height, therefore, of Bandl's ring is a measure of the danger of the case. It can be seen as an oblique groove running across the lower abdomen. It is said that when Bandl's ring rises two and a half inches above the pubic bone a dangerous thinning of the lower uterine segment is present. Bandl's ring runs obliquely across the hypogastrium. This helps to distinguish it from the only thing for which it may be mistaken, namely, the upper border of a full bladder. The upper border of a full bladder usually passes transversely

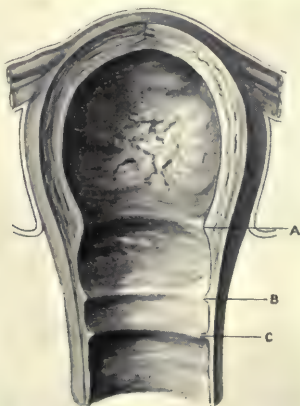


FIG. 112. Diagram of Bandl's ring. A, Bandl's ring; B, Internal os; C, External os.

across the hypogastrium. Always pass a catheter, however, pushing up the presenting part, if possible, so that the catheter can slip into the bladder. Sometimes the presenting part is jammed so tight that a catheter cannot pass into the bladder.

Round ligaments. In normal labour the round ligaments can be felt, especially the left, owing to the normal twist of the uterus bringing the left side more to the front than the right. When rupture of the uterus is threatening, the muscle of the round ligaments shares in the tonic contraction of the uterine muscle. The round ligaments stand out prominently, and are hard and taut.

Vaginal signs. On making a vaginal examination, the vagina is found unnaturally hot and dry. Its walls are swollen, and the labia are oedematous. The presenting part is probably high up, and is obscured by a large caput; the upper part of the vagina is pulled up, stretched and spacious—the ballooned vagina. With a pain there is no advance of the presenting part. There may be a little bleeding, showing that some uterine fibres have given way already. The border of the cervix may be thickened and the os become narrowed from blood effused into it.



FIG. 113. Large caput of difficult labour.

Effect on the mother. The woman herself is profoundly affected by the uncontrollable violence of the contractions of her uterus. She experiences the agonizing pain well known to every one as cramp. The uterus is very tender. The patient shrieks with pain if abdominal palpation is at all forcible. She is full of anxiety, and acutely conscious of the terrible crisis through which she is passing. Her eyes are haunted by the fear of impending death, her face is drawn and pinched with pain and exhaustion, her lips and mouth are dry, with sordes on her teeth. She moans continuously, her breath is quick and panting, her rapid pulse grows more rapid and feeble, sometimes uncountable, and her temperature continues to rise. Only when rupture occurs does relief come to her, and then it is the relief of shock.

Effect on the child. The retraction and contraction of the uterus so cramp and interfere with the placental circulation, that the child shows signs of asphyxia. Its movements are tumultuous, solid meconium comes away, although the head presents, and the heart is under 120.

Treatment of threatened rupture. *Immediate delivery is the one and only treatment* for both mother and child. Anaesthetize the patient. (1) If the head presents, and the foetal heart has been heard recently, apply forceps; (2) if

symptoms are urgent, the child is dead, do not hesitate to perforate; (3) if the breech presents, treat as under impacted breech; (4) if transverse, decapitate; (5) if the pelvis is too small to allow even a perforated and eviscerated child to pass, hysterotomy or Caesarean section and hysterectomy are the only alternatives.

Rupture following the signs of threatened rupture.

Where the rupture occurs. In most cases the lower uterine segment is tightly stretched over the child's head, and tears transversely where it is most stretched and thinned. Sometimes it is most stretched over the child's shoulder. When the tear has started, it may extend in any direction up to the fundus and down into the vagina. The important practical fact about the tear is whether the peritoneum has been torn or not. Rupture without tear of the peritoneum is called incomplete, and is less dangerous. Rupture with tear of the peritoneum is called complete.

Effect on the mother. Shock may be fatal, or the patient may die of haemorrhage. The shock may be less severe and subsequent peritonitis be the cause of death. She may recover. The change of aspect in the mother is striking. She may cry out and say that something has given way. She then passes from a condition of acute tension to one of shock. The hot, congested face of exertion becomes pale and cold. A clammy sweat appears on the forehead and cheeks. Her breathing, no longer panting, is now soft, shallow, and almost inaudible, except for an occasional moan. She no longer cries out with pain, but lies back prostrated and relaxed. Her pulse is very feeble and rapid, particularly if she has lost blood, although in some cases it may be feeble and slow. Her temperature may be sub-normal.

The change is not always so radical as this. The woman undergoes shock, but she is not so profoundly affected. Still the change is always both striking and sudden.

Diagnosis. The change of aspect in the woman will

suggest the probability of rupture. Examine by *abdominal palpation*. The physical signs differ with complete or incomplete rupture.

Complete. Some part of the foetus will escape through the rent. Sometimes the whole foetus is free in the peritoneal cavity. In either case the foetal parts are felt with surprising ease, which is in such marked contrast to the previous condition that there can be no doubt of the complication present.

Incomplete. The uterus will be found tender to the touch and bulging at one part. In both complete and incomplete rupture the hard body of the uterus is felt separate from the foetus or the swelling. It is so hard that it has been mistaken for the foetal head.

By vaginal examination the diagnosis can be verified. The previously felt presenting part has now receded. This is a certain sign, and is present in incomplete as well as in complete tears. There is haemorrhage of varying extent. Sometimes it is profuse, sometimes mainly internal and shown by increasing collapse, although occasionally the amount of haemorrhage is surprisingly small.

2. Quiet rupture. This is the form of rupture that we have most commonly seen in Ireland. It occurs in multiparae, who in previous labours have had deep lacerations of the cervix. The rupture is an extension from the old tear and scar tissue, and nearly always involves the vaginal vault. So quiet is the rupture that we on several occasions have been called to patients suffering from this complication, although neither doctor or nurse in attendance had any suspicion of the grave condition present.

The diagnosis is readily made by abdominal palpation and vaginal examination. When the rupture occurs the patient experiences distinct relief and cessation of labour pains with subsequent development of shock.

3. Rupture as the result of manipulations. (1) Attempts to turn, when the uterus is already approaching tonic contraction; (2) vigorous pulling, or pushing from the abdomen, of the foetus through an undilated os; (3) putting too many fingers through the os in a case of placenta praevia; (4)

removal of an adherent placenta—all four are not uncommon causes of rupture of the uterus.

The signs and diagnosis have already been given.

Treatment of ruptured uterus. With profound shock chloroform will not be necessary. We advise against laparotomy. In nearly all cases the child can be delivered. With the mother in the cross-bed position, pass a hand into the uterus, even through the rent into the peritoneal cavity, if necessary, and catch the child by both feet. Deliver it as a breech. There is always risk of extending the tear, but the case is full of risks, and laparotomy is a very great risk which we do not recommend. Remove the placenta manually.

If the child cannot be delivered, open the abdomen in the middle line, deliver the child and placenta and sew up the tear. Failing this perform hysterectomy. Such a case will be very hopeless.

What to do after delivery. A large piece of gauze should be loosely bunched in the hand as a housemaid holds a duster, and introduced *en masse*, so that it firmly fills the rent and exercises pressure on its lips, but does not penetrate into the abdomen to any extent. Within twenty-four hours the edges of the rupture contract and compress the gauze plug. After this, day by day, the plug should be loosened gradually, drawing out a little at a time to permit further retraction of the tear until the last of the gauze may be removed on the fourth or fifth day.

Plugging serves a threefold purpose: (1) it prevents intestines prolapsing into the vagina; (2) it drains away blood already in the abdomen; (3) it arrests further bleeding.

Treat the shock and collapse in the manner described under accidental haemorrhage.

This treatment, though simple, brings about as good results as operative treatment, and many women so treated have recovered. It stops the haemorrhage without adding to the shock. We adopted this plan of treatment in our last six cases, and all of the patients recovered.

If general peritonitis arises the case is wellnigh hopeless.

The only treatment to follow is to drain the peritoneal cavity and give continuous rectal irrigations of salt solution; cultures made from the pus will determine the infecting organism, indicating the serum that should be injected. Vaccines can be prepared from these cultures. See Appendix.

CHAPTER XII

ABNORMALITIES CONNECTED WITH THE PELVIS

Abnormal Pelves—Varieties—Signs before Labour—Treatment before Labour—Signs after Onset of Labour—Treatment after Onset of Labour.

Abnormal pelvis. The subject will be treated under the following headings:—

1. Growth and development of the normal pelvis.
2. The different kinds of abnormal pelvis.
3. Signs before labour.
4. What to do before labour.
5. Signs after labour has commenced.
6. What to do after labour has commenced.

I. Growth and Development of the Normal Pelvis.

The pelvis of the child is different in the general characters of its shape from the pelvis of the adult woman.

The promontory of the sacrum does not project and is relatively higher and further from the symphysis pubis; the sacrum itself is straighter from above downwards, its alae are more slightly developed, the ileo-pectineal lines are not so much curved and meet in an acute angle at the pubes, the rami of the pubic bones are relatively shorter, and the pubic arch is more angular. The pelvic canal is in consequence narrower and more funnel-shaped than in the adult.

The development of the pelvis from the foetal to the adult female type is due to causes that are mechanical and inherent.

The body-weight is transmitted down the spinal column to the sacrum. The sacrum is, in consequence, pushed down-

wards and forwards, and tends to rotate around a transverse axis, bringing the promontory downwards and forwards, and tending to send the coccyx and tip of the sacrum backwards. The posterior superior iliac spines become prominent as the sacrum sinks.

The pull of the sacro-iliac ligaments tends to widen out the lateral portions of the innominate bones and increase the curve of the ileo-pectineal lines to what is found in the adult pelvis. This increased curvature also widens out the pubic arch. The downward pressure of the trunk is



FIG. 114. Normal pelvis.

counteracted by the upward pressure transmitted through the femurs, which also tends to increase the curve of the ileo-pectineal lines.

The sacro-sciatic ligaments limit the posterior displacement of the lower part of the sacrum and cause the perpendicular concavity of the adult sacrum.

As they grow, the alae of the sacrum take on the curve of the ileo-pectineal lines and cause lateral concavity of the sacrum. The lateral masses of the sacrum, the rami of the pubes, and the ischium grow, and increase the width of the pelvic canal, which thus loses its long, funnel-shaped

character, and becomes shorter, more curved, and more circular in shape.

II. The Different Kinds of Abnormal Pelvis.

The kinds of abnormal pelvis can be conveniently grouped in the following classes:—

The Justo-Major and Justo-Minor Pelves.

Six Pelves flattened from before backwards.

- (1) Simple flattened pelvis.
- (2) Rachitic flattened pelvis.
- (3) Generally contracted flattened pelvis (rachitic).
- (4) Generally contracted flattened pelvis (non-rachitic).
- (5) Split pelvis.
- (6) Spondylo-listhetic pelvis.

Six Pelves flattened from side to side.

- (1) Naegele's pelvis.
- (2) Robert's pelvis.
- (3) Pelvis due to imperfect development of the sacral vertebrae.
- (4) Assimilation pelvis.
- (5) Funnel-shaped pelvis.
- (6) Kyphotic pelvis.

Six Pelves irregularly distorted.

- (1) Osteo or pseudo-osteomalacic pelvis.
- (2) Scoliotic pelvis.
- (3) Kyphoscoliotic pelvis.
- (4) Pelvis of hip disease (coxalgic).
- (5) Pelvis with bony or cartilaginous tumours.
- (6) Pelvis affected by old fracture.

The justo-major pelvis. In this pelvis all the measurements are equally increased. It may be found in normally built women, but is more commonly found in giantesses. Its obstetrical importance is that it may cause precipitate labour (p. 259).

The justo-minor pelvis. In this pelvis all the measurements are equally decreased. The result is a small, generally

contracted pelvis. It is one of the commoner forms of contracted pelvis. No cause is known, for although it occurs usually in small women or dwarfs, it is also found in women whose well-developed condition is apparently opposed to the coexistence of an ill-developed pelvis. The general diminution in the length of the diameters is not more than $\frac{1}{2}$ in.; if more, there is also flattening, and the pelvis is the generally contracted flattened pelvis.

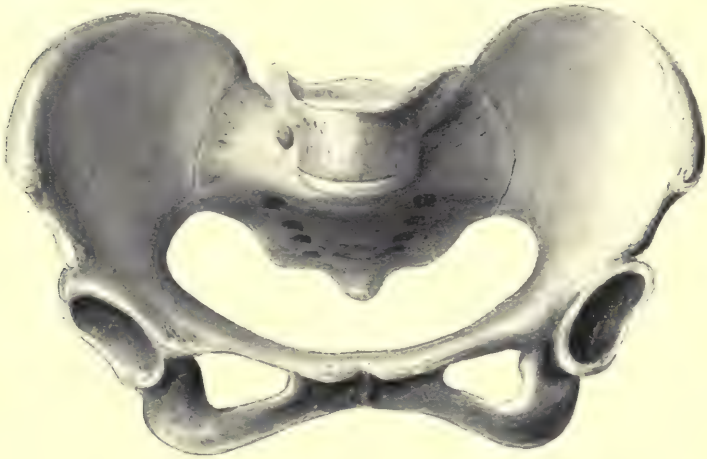


FIG. 115. Flattened pelvis.

Six pelves flattened from before backwards.

(1) **Simple flattened pelvis.** In this pelvis the sacrum and the sacral promontory sink downwards and forwards more than normal. A certain amount of sinking of the sacrum has been described as normal to the development of the pelvis from the foetal to the adult type, but in this pelvis the normal degree of such sinking has been surpassed. The reason for this has been said to be due to carrying heavy weights in childhood, or to inherent weakness of the ilio-sacral ligaments, but definite proof is wanting. It is the commonest form of contracted pelvis, and slight degrees of it are frequently found. It is seldom of very marked degree.

Characters of a simple flattened pelvis. The antero-posterior diameter of the inlet, which normally is $4\frac{1}{4}$ ins., is lessened. The sacral promontory bulges forward, and the transverse diameter may be somewhat increased in width.

(2) Rachitic flattened pelvis. Rickets occurring late in childhood is apt to cause a marked degree of pelvic contraction. The forces which operate in moulding the infantile into the adult pelvis are here exaggerated.

The wedge-shaped sacrum is driven further downward and forward, forcing the ilia farther apart, thus causing proportionate and sometimes even absolute increase in the size of the transverse diameter.

The promontory moves forward and causes increased prominence of the posterior superior spines of the ilium, and also helps to give the peculiar transverse ridge on the back so characteristic of rachitic *flattened* pelvis.

On account of the forward and downward movement of the sacrum, with consequent increased prominence of the posterior superior iliac spines, the sacro-iliac ligaments exert a greater force on the front part of the pelvis, causing increase in the curve of the ileo-pectineal lines and in the size of the sub-pubic angle.

The concavity from above downwards in the sacrum is greatly increased, but the concavity from side to side is diminished because the bodies of the sacral vertebrae move forward to a greater extent than the alae.

In addition to these changes there is another which is characteristic of the rachitic flattened pelvis, that is, flaring outwards of the crests of the ilia. The inner aspects of the bones are easily palpated, and the transverse measurement between the anterior superior iliac spines is proportionately greater than that between the crests. Instead of the normal $1\frac{1}{4}$ in. difference, the inter-spinous diameter may be equal to, or even greater than, the inter-cristal diameter.

This flaring of the ilia has been attributed to the intra-abdominal pressure and the force of the thigh muscles acting on the softened bones. That this is not the true explanation is apparent from the fact that this same

deformity has been observed in ante-natal rickets, and does not occur in osteo-malacia.

(3) **The generally contracted flattened pelvis (rachitic).** This is one of the commonest forms of contraction. Rickets is a disease that is liable to cause arrest of development in the bones. When this occurs, general contraction is added to the flattening already described.

(4) **The generally contracted flattened pelvis (non-rachitic).** This pelvis is a combination of general contraction (justo-minor) and simple flattening. In other words, a woman with general contraction may be subjected to influences causing downward and forward rotation of the sacrum, for instance, the carrying of heavy weights in childhood.

This is an uncommon form of contracted pelvis.

(5) **Split pelvis.** In this pelvis there is failure of union between the pubic bones at the symphysis. Extrophy of the bladder is a common accompaniment. In consequence of this failure the pelvis becomes widened out laterally, and is flattened from behind forwards. Delivery in these cases is simple.

(6) **Spondylo-listhetic pelvis.** This condition is due to the displacement of the last lumbar vertebra downwards and forwards, so that its articular surface lies in front of and becomes ankylosed to the anterior surface of the first sacral vertebra. Under ordinary circumstances it would be impossible for a woman to stand erect with the lumbar vertebrae in such a position. She can only do so by throwing her head back and, by constant effort, gradually bringing about the exaggerated lordosis seen in these cases. Considerable encroachment upon the antero-posterior diameter of the brim results. The patient with spondylo-listhesis of any degree shows marked lordosis, which produces great shortening of the waist, so that the ribs rest upon the iliac crests. The dip of the fifth lumbar vertebrae is seen and felt from behind.

Six pelves flattened from side to side.

(1) **Naegele's pelvis.** Naegele's pelvis is due to failure of development of the lateral sacral mass on one side. On

the affected side there is a firm synostosis between the sacrum and ilium, a diminution in the breadth of the innominate bone and the width of sacro-sciatic notch. The sacrum is rotated and displaced towards the diseased side. The symphysis is displaced towards the sound side and is not opposite the promontory. The ileo-pectineal line on the affected side is but slightly curved.



FIG. 116. Naegele's pelvis.

All these changes are readily understood if it is remembered that the leverage of the sacro-iliac ligaments on the posterior superior spines is lost because of the ankylosis of the sacro-iliac joint.

The result is that the pelvis is contracted obliquely, with marked shortening of the oblique diameter starting from the sound side. The true conjugate is usually unaltered. The transverse diameter is shortened.

Naegele's pelvis is supposed to be commoner than has been thought up to the present. There is no abnormality of gait or figure to lead one to suspect its existence. The external measurements lead to the diagnosis.

(1) The distance from the top of the sacrum to the tuberosity of the ischium on the diseased side is much less than that on the sound side.

(2) The distance between the tuberosity of the ischium on the affected side and the posterior superior spine on the sound side is less than that between the tuberosity of the ischium on the sound and the posterior superior spine on the affected side.

(3) The tip of the last lumbar vertebra is nearer to the anterior superior spine on the diseased than on the sound side.

In suspected cases a skiagram will give useful information.

Labour with Naegele's pelvis of a slight degree will result in natural, uninterrupted delivery.

(2) **Robert's pelvis.** In this pelvis both lateral sacral masses fail to develop, and there is synostosis between the sacrum and ilia. The posterior superior spines are as a consequence much closer than normal, and the pelvis is greatly flattened from side to side.

(3) **Pelvis due to the imperfect development of the sacral vertebrae.** The sacrum itself may be so ill developed that great transverse narrowing results.

(4) **Assimilation pelvis.** Not infrequently the last lumbar vertebra develops lateral masses and becomes united to the sacrum, so that the sacrum consists of six pieces instead of five. The result is that the pelvic canal is longer and deeper, and is more or less funnel-shaped, with small outlet and transverse flattening. If the deformity is not marked, obstruction at the outlet may be its first indication.

(5) **Funnel-shaped pelvis.** This condition is generally regarded as a persistence of the infantile type of pelvis, in which the pelvic cavity is straighter, longer, and narrower transversely than the adult pelvis, and narrows as it approaches the outlet, where obstruction to the passage of the child's head, if it has passed the brim, will occur.

(6) **Kyphotic pelvis.** Kyphosis in the lower lumbar region pulls the sacrum backwards, and is, therefore, the antithesis of the flattened pelvis.

The promontory is pulled upwards and backwards. In consequence the posterior superior spines are indistinctly marked. The lower part of the sacrum moves forward, thus diminishing the antero-posterior diameter of the

outlet. The ilia and ischia approach each other because of the backward displacement of the sacrum. Therefore the transverse diameter of the outlet is shortened. There is a marked reduction in the lever force of the sacro-iliac ligaments acting through the posterior superior spines; this lessens the curve of the ileo-pectineal lines and makes the pubic angle more acute.

Obstruction occurs at the outlet.

Six pelves irregularly distorted.

(1) **Osteo or pseudo-osteomalacic pelvis.** Osteomalacia is a disease of the bones usually occurring in pregnant women, in which the bones themselves become soft from loss of the salts of phosphorus and lime. Clinically it is characterized by rheumatic pains, tenderness over the bones, and finally inability to walk, with great deformity of the pelvis and marked spinal changes.

The deformity depends on the degree of softening of the bones. In marked cases the bones are crumpled inwards and the pelvic cavity becomes triradiate, while the pubic bones project forwards almost like the beak of a bicycle saddle, and can be taken between the fingers.

The best treatment for arrest of the disease has been found to be double oophorectomy, especially in young women. Lately a cure of the disease has followed daily injections of 5 to 15 gm. of adrenalin.

The pseudo-osteomalacic pelvis is one in which the same triradiate contraction of the canal due to crumpling of the bones inwards is found. It is not, however, due to osteomalacia, but to rickets of a severe degree occurring in late childhood. The flaring outwards of the anterior superior spines marks the rachitic form.

(2) **Scoliotic pelvis.** Scoliosis is as a rule due to rickets, and when it occurs high up in the spinal column is compensated by an opposing bend lower down, and the pelvis is left unaffected. When, however, the scoliosis occurs in the lumbar vertebrae, marked distortion of the pelvis is caused. The sacrum becomes twisted with the lumbar vertebrae, and the pelvis becomes obliquely contracted. In



FIG. 117. Osteomalacic pelvis.



FIG. 118. Scoliotic pelvis.

addition to the actual deformity resulting from the scoliosis, as a rule the further deformities of rickets are added, and marked distortion results.

(3) **Kyphoscoliotic pelvis.** Still further complications in the shape of the pelvis are caused by the combination of kyphosis and scoliosis. The actual kind of contraction produced depends on whether the changes due to scoliosis or those due to kyphosis predominate.

(4) **Pelvis of hip disease.** When hip disease occurs in early life, deformity of the pelvis results from the absence of pressure of the affected femur with consequent oblique contraction. In addition to this, especially when the patient has had a long time in bed, there is atrophy of the bones; and furthermore, when the patient begins to walk, tilting of the pelvis and scoliosis come to balance as far as possible the shortening of the affected hip. This combination of sequences produces considerable distortion of the pelvis. The contraction is more marked on the sound side.

(5) **Pelvis with bony or cartilaginous tumours.** Distortion of any nature may result.

(6) **Pelvis affected by old fracture.** Great distortion of the pelvis may result owing to fracture of the bones, from which the patient is fortunate enough to recover.

Frequency of abnormal pelvis.

With the exception of the simple or rachitic flattened pelvis, the generally contracted pelvis, and the assimilation pelvis, abnormal distortion of the pelvic canal is fortunately rare, so rare in fact that it is the rule rather than the exception for a general practitioner to go through life without seeing any one of the rarer forms.

Should, however, one of the rarer forms be met with, the treatment of the case should be conducted on the lines laid down for the commoner forms of contracted pelvis.

III. Signs before Labour.

Suspect contracted pelvis in any woman who has had hip disease; who walks with a limp; who has or has had disease of her spinal column, kyphosis or scoliosis of the lumbar

region; who has a marked pit above the sacrum; who has signs of rickets; who is a dwarf; whose pelvis seems twisted; or who complains of severe pain and tenderness in her bones and increasing difficulty in walking. Pendulous abdomen in a primigravida suggests contracted pelvis. The presenting part of the child in the last weeks of pregnancy sinks into the pelvis. If this cannot happen, the abdomen falls forward with the weight of the child, which rests on the abdominal wall and not on the pelvic bones.

If, on palpating a primigravida in the last three weeks of pregnancy you find a malpresentation, suspect contracted pelvis. Inquire into a multigravida's history of her previous labours, and suspect contracted pelvis if they have been difficult. Lastly, as a precaution, measure all primigravidae externally at the end of the seventh month, and if there is contracted pelvis, these measurements will suggest its presence.

IV. What to do before Labour.

Take the external measurements with the patient in bed.

External pelvimetry. Measure with either Duncan's, Baudelocque's, or Martin's pelvimeter. Skutsch's pelvimeter will do equally well.

The measurements taken are (1) the interspinous, (2) the intercrystal, (3) the external conjugate.

To measure the interspinous diameter. Sit on the edge of the bed facing the patient, who lies on her back. Fold the sheet over the hips and thighs so as not to expose her. Feel with your thumbs or index fingers for the outer edge of the anterior superior spines and press the points of the pelvimeter against these outer edges. Keep the instrument in place and read off the scale. The average measurement is $10\frac{1}{4}$ in. or 26 cm. If the interspinous diameter can be spanned by the outstretched hand the pelvis is contracted, but not being able to do so is no proof of the absence of contraction.

To measure the intercrystal diameter. Take the points of the instrument between your fingers and thumbs and move

each point along the outer edge of the intercrystal borders. Read off the measurement of the greatest width between the crests. It is $11\frac{1}{2}$ inches, or 29 cm.

Importance of these measurements. Separately, these measurements have little or no importance. But the relation between the two is of importance. As we have already said, in a flattened rachitic pelvis the iliac fossae look more forward than normal, and the width between the spines approaches and even equals the width between the crests. Hence, if there is not more than $\frac{1}{2}$ an inch or $1\frac{1}{4}$ cm. difference between these two measurements a rachitic flattened pelvis is present. They may both be wider than normal, yet the fact that the intercrystal does not exceed the interspinous by more than $\frac{1}{2}$ inch is strongly suspicious of flattened rachitic pelvis.

To measure the external conjugate. The patient lies on her side with her knees drawn up and her body bent a little forward. Measure from below the last lumbar vertebral spine to the furthest point of the front of the pubic bone. To find the depression below the last lumbar vertebra in a fat woman, feel for the posterior superior spines, join them by a line, and mark the skin one inch above the centre of this line. Place the tip of one limb of the calliper on this mark and the other over the centre of the top of the pubes and read off the measurement. It is normally $8\frac{1}{4}$ ins., or about 21 cm.

Importance of this measurement. If this measurement is 7 in. or less (17 cm. or less) the antero-posterior diameter of the brim is less than it should be. If small, take into account the other measurements. If the relation between interspinous and intercrystal is normal, but they themselves are small, you may be dealing with a generally contracted pelvis; if the difference between the two is less than normal, a flattened rachitic pelvis. External measurements are more suggestive than precise.

When the measurements are reassuring. Ascertain by palpation if the head is in the brim. If not, perform external cephalic version, which is easy at this period. If this is required the patient should return from time to time for

examination to see if the head can be pushed into the brim.

The head overrides and cannot be pushed into the brim, or the lie is not one of vertex, or the external measurements are unsatisfactory and abnormal. Proceed to make sure of the true conditions, so that the patient may not incur the dangers of labour when her pelvis will not allow a normal delivery. Find out by two methods, for both of which an anaesthetic is needed. One assistant is required, and he can also give the anaesthetic. The first method is that known as Müller's method, the second, internal pelvimetry by means of Skutsch's pelvimeter.

Müller's method. Internal pelvimetry only determines accurately the size of the pelvic canal. It does not tell anything about the size of the foetal head. Müller devised his method to compare the size of the head to the pelvic inlet. To carry out Müller's method, put the patient into the cross-bed position. Sit between her legs, and when the abdomen is well relaxed pass half of the right hand, with due care to asepsis, into the vagina. With the left hand on the abdomen catch the head and press it down into the brim. If it is not over the brim first get it there by external version. The assistant also helps to press the head down. Your hand in the vagina will detect whether the largest diameter of the head enters the brim, and your thumb outside the vagina detects any over-riding of the pubes by the head. Usually this is not a difficult method when the patient is under an anaesthetic, and it gives an accurate estimate as to whether the child's head will mould into the brim or not. If the woman is very stout, or if there is a posterior position of the occiput, Müller's method is of very little value.

Internal pelvimetry. The patient is kept in the cross-bed position and a catheter passed. We also douche the vagina.

Three diameters are to be measured, namely, the true conjugate, the true transverse, and the width between the ischial tuberosities. For measuring the first two, which are by far the more important, Skutsch devised his ingenious

pelvimeter, and so efficient is this instrument that we have found that any one accustomed to its use is able to get and prove accurate measurements. We will not describe the instrument. You must handle it and learn its use before starting to work with it.

First measurement. First feel for the centre of the top of the pubes, and put a cross with ink or a dermatograph pencil over the spot. Pass half the left hand into the vagina and feel



FIG. 119. Measuring with Skutsch's pelvimeter.

for the sacral promontory. The true promontory is formed by the wedge-shaped piece of cartilage between the last lumbar vertebra and the sacrum. There will be no difficulty in identifying it, for the last lumbar vertebra immediately slopes back above it; in other words, it is the most prominent part. The junction between the first and second sacral vertebrae is sometimes very prominent in flattened pelvis, forming what is known as a false promontory. This may

be mistaken for the true promontory. Before inserting the rigid limb see that the points of the arms are opposite each other and on the same plane. Push the rigid bar of the Skutsch's pelvimeter, with its point turned backwards, up



FIG. 120. First measurement. Skutsch's pelvimeter.

to the promontory, and keep it pressed against the promontory by the finger-tips. When the rigid bar is in place the point of the mobile arm should be brought opposite the ink mark by manipulating the stiff arm rather than by bending the flexible arm. Get your assistant to put the

point of the flexible bar on to the skin mark over the pubic bone, so that it just touches the skin without indenting it. Withdraw the instrument carefully, so that the limbs are not forced apart at all. When the instrument is withdrawn there is great likelihood of separation. There is a shoulder on the connecting arc that allows separation of the limbs during removal and subsequent accurate readjustment. Measure between the points with a rigid steel measure, either marked in inches or centimetres.

We always repeat each measurement three times. If there is any gross difference between the measurements we know that we are mistaking the promontory, but as a fact we find our three measurements are nearly always identical, or at the most differ by one-fifth of an inch. If there is this difference, take the average.

Second measurement. It is inconvenient to turn the rigid limb twice, so next measure the distance from the skin over one trochanter to the furthest point of the internal transverse boundary of the pelvic brim on the opposite side. Make a cross on the skin over the left trochanter. Bend up the patient's thighs on her abdomen and flex her legs. With the right half hand in the vagina feel for the widest point on the right ileo-pectineal line. Push the stiff limb up and hold it to this point. Your assistant then presses the flexible limb down to the skin mark, so that it just touches but does not indent the skin. Withdraw carefully, separating the limbs while doing so, and readjust before measuring. Measure the distance between the two limbs. Repeat three times. This is the only measurement in which there is likely to be any discrepancy between the three measurements, both because the widest point is a little difficult to locate and the limbs may be separated in withdrawal. The use of the shoulder on the Skutsch enables you to avoid the latter risk. Learn the use of the shoulder before measuring. By its use the limbs can be widened for removal, and when outside restored to the original position. In practice we find the first attempt at each measurement the least accurate, probably because the stiff arm does not at first sufficiently indent the soft tissues.

Third measurement. Turn the rigid bar round so that its curved tip points towards the flexible limb instead of away from it. Pass two fingers into the vagina and place them on the back of the pubes. Pass the tip of the rigid bar up to them and hold it against the back of the most prominent part of the pubic bone. Your assistant lightly applies the flexible limb to the spot marked on the skin

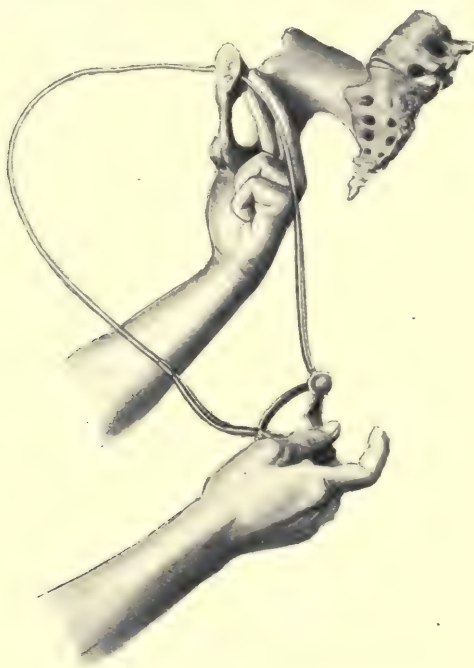


FIG. 121. Third measurement.

over the centre of the pubes. Withdraw and measure. This gives the thickness of the symphysis and soft parts covering it. Repeat three times.

Fourth measurement. Again bend up the patient's thighs and legs. Put your left half hand into the vagina and feel for the widest point of the left transverse border of the brim. Hold the point of the stiff limb to this spot. The assistant lightly applies the flexible point to the spot on the skin over the left trochanter. Making use of the shoulder,

separate the limbs a little, withdraw, readjust, and measure. Repeat three times. This measurement gives the thickness of the parts between the left transverse border and the skin over the left trochanter.

Deductions from these measurements. The first measurement gives the antero-posterior diameter of the brim plus the thickness of the pubes and soft parts over it. The third measurement gives the thickness of the pubes and soft parts over it. By deducting the latter from the former an accurate measurement of the true conjugate of the brim is obtained. The second measurement gives the transverse diameter of the brim plus the thickness of bone and soft parts between the ileo-pectineal line and the skin over the trochanter. The fourth measurement gives the width between the ileo-pectineal line and the skin over the trochanter. Deducting the latter from the former gives the true transverse diameter of the brim.

Thus, by this instrument, accurate measurements of the pelvic brim are obtained. We recommend it strongly, for with a little practice outside the body, and understanding how to work with it, we think accurate measurements should be obtained.

Measurement between the inner surfaces of the ischial tuberosities. There is seldom contraction at the outlet without contraction at the inlet, which is of more importance. In assimilation, kyphotic, and funnel-shaped pelvis, there is contraction of the outlet over and above that at the inlet, and this measurement will show it. Put the patient in the position she is in for the second and fourth Skutsch measurements. Feel through the vagina the inner surface of each ischial tuberosity. Place the nail of the index finger against one, and the tip of the thumb against the other. Withdraw with as little change of position as possible and measure. This is rough, but it is sufficient. Normally, the width is about $4\frac{1}{4}$ inches. If less than three inches there may be great difficulty in getting the head through the outlet. An ordinary compass or Skutsch's pelvimeter give more nearly accurate results, and one of these is to be preferred.

Rules of Treatment.

Guiding rules gained from Müller's method. Müller suggested that his method should be applied once a week, and on the day in which there is difficulty in pushing the head into the brim, premature labour should be induced. The head will mould and pass the brim as in normal labour. So long as the head can be pushed into the brim all is well. If labour has to be induced before the thirtieth week it is better to leave the patient until full term, if it can be arranged that she be delivered by Caesarean section or pubiotomy. But for the general practitioner the induction of premature labour is still the most advisable treatment for these cases.

Rules according to Measurement.

Difference between flattened and generally contracted pelvis. The measurements will have shown whether you are dealing with a simple flattening or with a general contraction of the pelvis.

The measurements which guide the following rules apply to simple flattened pelvis only. The treatment for a generally contracted pelvis of a certain degree is that for a simple flattened pelvis with a true conjugate half an inch shorter. Thus, the rules for a flattened pelvis of the second degree form the rules for a generally contracted pelvis of the first degree. The difference is owing to the fact that, whereas in simple flattened pelvis the transverse diameter is as large as normal, in generally contracted it is smaller.

Contraction of the first degree. True conjugate down to $3\frac{3}{4}$ in. A reduction of half an inch. The normal conjugate is $4\frac{1}{4}$ in. If this is diminished by anything up to $\frac{1}{2}$ in. contraction of the first degree results. Such a conjugate approaches the normal, and, as a rule, natural delivery will result. However, complications are more likely to arise than with normal sized pelvis. If the head is arrested at the brim, the lower uterine segment is empty, and the whole pressure of the uterine contractions is exerted on the unsupported membranes. From this cause premature rupture of the membranes,

with gradual loss of all the liquor amnii, is likely to occur. The uterus then shuts down on the child and acute metritis from irregularly distributed pressure results. When the membranes rupture the rush of liquor amnii may carry down a loop of the cord past the unfixed presenting part, resulting in prolapse of the cord, a common complication of minor degrees of contracted pelvis. Malpresentations, breech, face, brow, and transverse, resulting from inability of the head to fix in the brim, are frequent accompaniments of these cases of slight contraction. For the same reason the pressure of the presenting part on the cervical ganglia is missing, and uterine inertia may result.

Treatment. Let the woman go to full term. When labour starts keep her in bed and discourage any efforts at bearing down during the first stage. This will tend to prevent premature rupture of the membranes, and will allow the head to mould into the brim. If the head fails to pass the brim when the membranes rupture the antero-posterior diameter can be made half an inch longer by putting the patient in Walcher's position (p. 296).

If there is delay in the second stage dangerous to mother or child, deliver with forceps if the head is fixed in the brim by its largest diameter. Version may be the best treatment for malpresentations, in flattened but not in generally contracted pelves, and replacement or version for prolapse of the cord.

Contraction of the second degree, $3\frac{3}{4}$ - $3\frac{1}{4}$ in. A further reduction of half an inch. Living children are frequently delivered naturally through a pelvis with a conjugate between $3\frac{3}{4}$ in. and $3\frac{1}{4}$ in. The nearer the measurement is to $3\frac{1}{4}$ in. the more unlikely is normal delivery to occur.

Children presenting by the breech, naturally or after internal version, can always be delivered. The foetal mortality in breech delivery is so high that we do not recommend version to the experienced obstetrician except under most exceptional circumstances.

The use of high forceps will occasionally succeed in dragging a living child through such a pelvis, more often

a dead child, and in the majority of cases it completely fails to mould the head into the brim.

If a general practitioner should discover a contraction of the second degree early in pregnancy we would strongly recommend the induction of premature labour. If induction is undertaken before the thirty-second week a child capable of living to maturity is rarely obtained. Induction is usually considered worthless after the thirty-sixth week, because the size of the head increases to an inconsiderable degree between this and full term. Our own experience does not fully bear out this view, and we have often successfully induced labour within a week of full term.

Women with contracted pelves have a tendency to carry their children beyond the normal period. This results from the non-fixation of the head in the lower uterine segment and the consequent lack of stimulation of the cervical ganglia by the presenting part, which is probably the cause of the onset of labour at full term.

The safest and best means for the induction of premature labour is by Krause's method (p. 291), according to the indications for induction given by Müller's method (p. 281). The death-rate of premature children is very high, 50-70 per cent. dying in the first year of life; therefore we do not consider this operation one to be selected in hospital practice.

We prefer to let the patient fall into labour at full term, endeavouring to avoid premature rupture of the membranes by rest in bed under the influence of scopolamine and morphine, and by preventing efforts at bearing down. The bowels and bladder are kept empty. If the membranes do not rupture spontaneously they are not ruptured until the second stage is well advanced.

When the membranes have ruptured the patient is put in Walcher's position, a tight binder, pinned from above downwards, is applied, and she is encouraged to use her pains and bear down vigorously. Quinine gr. xv is given if necessary. When the pains are strong and the woman vigorous it is surprising how a large head is gradually moulded into the contracted pelvis, although many hours

may be required for completion of the second stage. When once the largest diameter of the child's head has passed the brim delivery presents no difficulty.

The ease of moulding may be greatly interfered with by malpresentations, which, described under contractions of the first degree, are liable to occur here with greater frequency and more disastrous consequences.

During this prolonged labour the foetal heart should be frequently listened for, and a careful watch kept for indications of maternal distress. Should any of these arise pubiotomy, hysterotomy, or symphysiotomy will be clearly indicated.

Caesarean section may appear the best method of delivery if there is great mobility and overriding of the head above the brim early in labour. This is more liable to occur the nearer the true conjugate approaches $3\frac{1}{4}$ in.

If the child is dead perforation is, of course, the operation of choice.

Contraction of the third degree $3\frac{1}{4}$ – $2\frac{3}{4}$ in. A further reduction of half an inch. Small living premature children have been delivered naturally through such a pelvis. Dead children have been dragged through by forceps. Delivery by version is possible, but with a full-sized child death is practically inevitable.

Induction of premature labour may be advised as a suitable operation for the general practitioner, with the warning that the earlier the induction the higher is the foetal mortality immediate and remote. The nearer the true conjugate is to $2\frac{3}{4}$ in. the earlier in pregnancy must labour be induced.

Pubiotomy and symphysiotomy are possible, but become dangerous for both mother and child in proportion as the size of the true conjugate approaches the lower limit. Wide separation of the pelvic bones causes great laceration of the soft parts, exposing the woman to the risks of haemorrhage and sepsis.

In the hospital, if the case is seen early, uninfected by vaginal examinations, and with unruptured membranes we would deliver by Caesarean section. If seen late in labour we would perform symphysiotomy, pubiotomy, or hysterotomy,

the latter being the operation of choice when the degree of contraction approaches the lower limit.

With dead children perforation always permits delivery.

Contraction of the fourth degree, $2\frac{3}{4}$ - $2\frac{1}{4}$ in. A further reduction of half an inch. Living full-term children cannot be born through a pelvis contracted to this degree. Premature children who will live can be delivered only after pubiotomy or symphysiotomy. Full-sized dead children can be extracted only with the greatest difficulty after perforation, cephalotripsy, and cleidotomy. The maternal mortality from this operation is very great, much greater than that from Caesarean section, in a well-appointed hospital. We would, therefore, deliver by Caesarean section at full term, and if the patient were first seen late in labour we would perform extra-peritoneal Caesarean section.

Contraction of the fifth degree. Below $2\frac{1}{4}$ in. These cases present no difficulties. The women are always dwarfs, their danger in labour is the common talk of the neighbourhood, and they always apply, or are sent, to a hospital in plenty of time for delivery by Caesarean section.

In describing the treatment of contracted pelvis we have indicated that for simple flattening. General contraction causes greater obstruction than simple flattening, and is considered to be a degree worse, that is, the treatment for general contraction of the second degree will be found under the rules of treatment given for contraction of the third degree of simple flattening.

With the various excellent modern operations it is obviously no longer justifiable to perforate a living child. We would go further than this and make the definite statement that a child should not be allowed to die from delay in delivery due to contracted pelvis. An obstetrician has not done his duty properly if, in consequence of this delay, a dead child is born.

Induction of labour. (Krause's method.) This is a simple and easy matter. An anaesthetic is not necessary. Put the patient in the cross-bed position, wash the external genitals, pass a catheter, thoroughly douche the vagina, after first scrubbing the vulva with soap and water. Put in a posterior

speculum and catch the anterior lip of the cervix with a bullet forceps. Wipe the os with a sterile swab wet with biniodide of mercury. If the os is visible, pass the bougies by sight; if not, pass them by touch, guiding them with two fingers in the vagina. Take a urethral bougie of about No. 10 size, boil it in 1-1000 corrosive sublimate and pass it through the os. Push it as far into the uterus as possible without using force. It makes a way for itself. If it appears not to have reached the fundus, but to have been stopped by the placenta, withdraw it and put it in a different direction. Be careful to insinuate it gently through the internal os, so that it slips up between the membranes and uterine wall and does not rupture the membranes. Try to get two bougies into the uterus. If the membranes are ruptured, it is a misfortune, and further manipulation should cease. Labour will follow rapidly on the rupture of the membranes, but the outlook for the child is more unfavourable. When the bougies are in, plug lightly round the ends that project into the vagina with iodoform gauze soaked in boiled glycerine. Let the patient walk about. Withdraw the bougies when labour pains are definite. Sometimes labour does not come on. If it does not come on within forty-eight hours, withdraw the bougies and repeat the whole operation with a new set and leave the patient for twenty-four hours. *If labour has not started*, withdraw the bougies, douche and dilate the cervix with Frommer's dilator, or better still (provided the kidneys are sound), inject $\frac{1}{2}$ oz. to 1 oz. of sterilized glycerine, by means of a boiled gum elastic catheter, between the uterus and the membranes. This will induce labour within three hours. It is right to add that this method has at present few advocates. It is considered dangerous, for hematuria and even death are said to have followed its use, although it must be added that deaths have resulted from every method. Our experience, however, leads us to the conclusion that it can with safety be employed provided strict asepsis is observed, air excluded from the uterus, and the amount of glycerine used be not greater than that which we have indicated. Of course, every care should be observed in selecting cases, excluding those with

kidney disease, anaemia, or other debilitating conditions, but with these reservations we hold that it is a safe and satisfactory procedure.

V. Signs after labour has begun.

Mechanism in a case of flattened pelvis with vertex presentation. The principal difference between the mechanism in flattened pelvis and that in normal pelvis is that the sagittal suture, or in other words the diameter from the occiput to the front of the head, lies not in the oblique but in the transverse diameter, which is longer than the oblique. Again, in a foetal skull the width between the parietal eminences (the parietal diameter, $3\frac{3}{4}$ inches) is greater than the width from just below one eminence to just above the other $3-3\frac{1}{4}$ inches). Normally, the biparietal diameter lies in one oblique diameter, which is amply wide enough for it. But with flattened pelvis it lies in the antero-posterior diameter. Consequently the head will have a better chance of passing if it tilts towards one or other shoulder. This tilting actually occurs. Usually the tilt is such that the sagittal suture, running transversely, is brought nearer to the sacral promontory. It is known as anterior asynclitism, anterior parietal presentation, or Naegele's obliquity. Rarely, the tilt brings the sagittal suture closer to the pubis, posterior asynclitism or posterior parietal presentation. The head moulds considerably during its passage through the pelvis. The occipital and frontal bones are approximated, and are compressed beneath the parietal bones. The latter also overlap each other, the posterior as a rule being beneath the anterior. This overlapping is rendered possible by the presence of the sutures and fontanelles. The head does not flex properly, for in order to flex the biparietal diameter must engage in the brim. In flattened pelvis the biparietal diameter $3\frac{3}{4}$ inches is hindered and the bitemporal $3\frac{1}{4}$ inches advances. This means some extension. Thus it happens that in contracted pelvis the anterior fontanelle is as easily felt as the posterior.

Significance of mechanism. When the vertex is felt high up and presenting, the sagittal suture runs transversely,

asynclitism is well marked, and both fontanelles are easily felt, contracted pelvis is diagnosed.

Mechanism in generally contracted pelvis with vertex presentation. The greater difficulty that the head meets in passing the brim leads to an exaggerated degree of flexion and the posterior fontanelle presents. The head normally flexes to pass its suboccipito-bregmatic diameter through the pelvic brim. Here we have a general smallness of the pelvis, hence even to pass a section of the head in advance of the suboccipito-bregmatic diameter flexion is needed; consequently, flexion is early and extreme.

Significance of mechanism. When on vaginal examination the head is found high up, and flexed so fully that the posterior fontanelle presents, it is most likely a case of generally contracted pelvis. In such cases a caput succedaneum forms before the os is fully opened, and the cervix is pulled up over the caput rather than that the head descends through the pelvis.

Signs common to both forms. In the early stages of labour there are *the four cardinal signs that the presenting part has not reached the lower uterine segment and become fixed by it*, namely, (1) ballotting of the presenting part, (2) protrusion of membranes through the os, (3) no presenting part is reached by two fingers in the vagina, (4) empty cervical canal, which hangs down like a curtain.

Malpresentations. Under malpresentations it was mentioned that contracted pelvis is a cause of any one of them. Therefore, whenever there is a malpresentation in a primigravida, or a multigravida with a history of difficult labours, it is more than likely a case of contracted pelvis.

Pendulous abdomen. In a primigravida a pendulous abdomen at full term suggests that the head cannot reach the lower uterine segment, and a contracted pelvis is by far the most probable cause.

Early rupture of the membranes. The unsupported bag of membranes frequently ruptures early, long before full dilatation of the os. The effect is unfortunate. The os dilates slowly, the waters drain away, and the child is directly pressed upon by the contracting uterus; in short, the

symptoms described as threatening rupture of the uterus may arise. Prolapse of the cord is also likely to occur. In other cases the pains slack off after rupture of the membranes, i.e. uterine inertia supervenes.

Rupture of the uterus. Contracted pelvis, leading to obstructed labour with the signs described under 'Threatening rupture of the uterus', is the commonest cause of ruptured uterus.

VI. What to do when labour has begun.

Before rupture of the membranes. If it is not possible to measure by Skutsch's pelvimeter, a rough estimate can be obtained by measuring the diagonal conjugate.

Measuring the diagonal conjugate. Pass the index and middle finger of one hand up to the sacral promontory. If it cannot be reached the diagonal conjugate is longer than your fingers, and if any contraction is present it is probably slight. Push the radial side of the index finger up against the pubic arch. Press a finger of the other hand at right angles to the radial border of the index finger as close to the pubic arch as possible and mark the skin with the finger nail. Withdraw the fingers and measure across the back of the fingers from this mark to the tip of the middle finger. This is the diagonal conjugate. By deducting half to three-quarters of an inch the true conjugate is approximated, but the actual difference depends on the inclination, depth, and thickness of the pubic bone, together with the relative descent or elevation of the promontory. For practical working purposes this measurement is very uncertain, and the less the degree of contraction the greater will be the uncertainty. It is uncertain because of the impossibility of accurately estimating the different factors. It is also uncertain because the skin of the forefinger is stretched when reaching to the promontory. This stretching is never allowed for when taking the measurement, although it may cause 1 cm. shortening in the diagonal conjugate. Next, with the half or whole hand in the vagina, feel round the pelvic brim and estimate roughly its size. Also endeavour to estimate any difference in the curvature of the ileo-

pectineal lines. By trying to spread out the hand, first in the anteroposterior and then in the transverse diameter, the size of these diameters can be gauged to some extent.

If the head presents, try to push it into the pelvic cavity, using Müller's method.

The membranes have ruptured.

The pelvis is big enough to allow the whole hand to pass the brim.

(a) **If the head presents.** Keep the patient in bed and watch for signs of distress. This will allow time for the



FIG. 122. Walcher's position.

os to dilate and the head to mould. If the head attempts to enter the brim and the os is open, put the patient in Walcher's position, giving morphine and scopolamine hypodermically.

Walcher's position. The patient lies on her back with her hips projecting over the edge of the bed and her legs and thighs hanging down by their own weight. The feet must not touch the ground, or this extension will not occur. Sometimes the bed is not high enough. If so, raise it by

putting blocks or big books under the side legs. Walcher's position is painful to maintain, therefore arrange for the patient to rest her feet on chairs between the pains, and when the pains come on tell her to let her legs hang down. She can lie for hours in this position covered by blankets. The weight of the lower limbs rotates the pelvis on the sacro-iliac joints so that the pubic bone sinks. In this way the true conjugate is actually lengthened by half an inch, and this addition is of the greatest value.

At the same time press the head down into the brim and put on a right binder.

When the head has descended into the pelvic cavity, and its largest diameter is engaged in the brim, get the patient out of Walcher's position. If labour has been prolonged, put on forceps and deliver.

If the head does not descend in spite of Walcher's position. If the head does not descend, in spite of contraindications, try forceps in a tentative manner if maternal or foetal signs of distress occur. If this fails pubiotomy, symphysiotomy, or hysterotomy is indicated. Should the child die, perforate. Slowing of the foetal heart is more ominous than increased rapidity. Therefore, interference is indicated by increased rapidity, and should not be delayed until the foetal heart becomes slower.

(b) **If there is a malpresentation.** Turn the child and bring down a leg, provided it occurs in a flattened pelvis of the first or second degree. If the pelvis is generally contracted version is contra-indicated, and the pelvis should be enlarged.

When the time comes for the passage of the head through the brim, give the patient chloroform and put her in Walcher's position. This will aid delivery.

If the child is dead and there is difficulty in delivery, perforate the after-coming head. The condition of the child can be ascertained by feeling for the pulsations of the cord.

The membranes have ruptured.

The pelvic brim is so small that the hand cannot pass it.

The contraction is probably of the fourth degree or less.

In such a case there will be extreme difficulty in dragging a crushed child through the pelvis, therefore perform extra-peritoneal Caesarean section.

When symptoms of threatened rupture have arisen.

Deliver at once by extraperitoneal Caesarean section, perforation, decapitation, or embryotomy as the case may be.

Again, if the contraction is very small, it will be wiser to run the risk of hysterotomy rather than that of attempting to cut up and deliver the child, for when the pelvis is as small as this, perforation and embryotomy are exceedingly difficult. Delivery by abdominal section, desperate though it is, is probably easier and safer in these extreme cases of contraction.

Sequelae occurring in the puerperium after difficult cases of contracted pelvis. The vaginal and intra-uterine manipulations increase the liability to sepsis as in other labour cases where they have to be carried out.

In cases of contracted pelvis there is, moreover, a liability for either urinary or faecal fistulae to appear from the third to fifth day after delivery. During the prolonged and obstructed labour the compressed tissues between the child's head and the bony rim of the pelvis are devitalized. A slough separates in a few days. In front, the cervix or vagina and the base of the bladder are compressed, and a cervico-vesical or vagino-vesical fistula results; behind, a similar utero-, cervico-, or vagino-rectal fistula results.

The treatment of these fistulae belongs to gynaecology.

Rupture of the symphysis occasionally occurs, usually in association with tuberculosis of the joint.

SYNOPSIS OF TREATMENT OF DIFFICULT DELIVERY

1. Ask for the *history of previous labours*. If the patient has been normally delivered of a live child, there cannot be any marked degree of contracted pelvis.

2. Ascertain whether the patient is in labour or not. Remember that the os of a multipara often admits one finger in the later months of pregnancy. Diagnose the lie by abdominal palpation.

3. If the patient is in labour, the cardinal signs that something unusual is present are (1) ballottement, or absence of presenting part, (2) sausage-shaped bag of membranes which bulges with the pains, (3) the cervical canal is empty and hangs down, (4) no presenting part is felt by two fingers in the vagina.

When these signs are present, it is essential in a primigravida, or in a woman who has had difficult labours and still-born children, to find out if there is any contraction of the pelvis and the degree.

Accuracy can be attained only with Skutsch's pelvimeter. If one is not available pass two fingers into the vagina and endeavour to obtain an accurate measurement of the diagonal conjugate. If the fingers cannot reach the promontory of the sacrum the diagonal conjugate is longer than your fingers and only very slight contraction can be present. With the whole or half hand in the vagina feel for the ileo-pectineal lines, note if they are symmetrical or not, and if the transverse diameter seems less than normal. To do this thoroughly it is sometimes necessary to administer an anaesthetic. The hand in the vagina also diagnoses the presentation.

The four cardinal signs are present, but the pelvis is not contracted. Keep the patient in bed until the membranes rupture. When this occurs make a vaginal examination to determine if the cord has prolapsed.

When the membranes have ruptured. If diagnosis by abdominal palpation has been impossible previously it may become quite easy after rupture of the membranes. In case of failure to diagnose in this way, again make a vaginal examination, passing the whole hand if necessary.

Breech and face require no interference. In transverse, brow, hydrocephalus or monster, perform podalic version.

Cases in which face, breech, or vertex passes the brim, and then further progress stops some time before complete delivery.

General reasons. 1. The os may be dilating slowly owing to cicatricial tissue in its substance, early rupture of the membranes, or congenital narrowing.

2. Uterine inertia may be present.

In these cases get the patient to sleep. Forcibly open the os only when maternal or foetal signs of distress begin, as evidenced by rise of the maternal temperature and pulse or changes in the foetal heart-rate.

Face. Special reasons. Progress of the face stops, because the chin is turned backwards. Make the patient sleep, lying on the side towards which the chin points. When she wakes her pains may be stronger and cause rotation.

Breech. Special reasons. The breech is impacted. Put your half or whole hand into the vagina in order to make a diagnosis. Remember the possibility of locked twins. Treat according to the condition found.

Vertex. Special reasons. The vertex passes the brim and reaches the pelvic cavity, but further progress ceases. Remember that a kyphotic or assimilation pelvis does not cause obstruction at the inlet, but at the outlet. Rigid tissues and strong muscles in the pelvic floor frequently cause obstruction, particularly in elderly primiparae. In such cases put on forceps. If moderate force fails to make the head progress, put your whole hand into the vagina, passing it up posterior to the head, and diagnose the condition present. The case may be one of locked twins, in which the head of the second child is jammed into the neck of the first; or a monster with enormous shoulders, hydrothorax or other deformity; or the arm may be prolapsed by the side of the head. If any of these are present, treat according to the rules already laid down. In the absence of these conditions remember that forceps may have been put on too early, before the largest diameter of the head has fixed in the brim, or that a short cord, or the cord around the neck, may be delaying delivery.

Signs of threatening rupture of the uterus are present. Deliver as rapidly as possible, either by forceps, perforation, fillet on the breech, embryotomy, decapitation, or other operation, as the case may be.

CHAPTER XIII

ABNORMALITIES OF THE THIRD STAGE

Retained or Adherent Afterbirth—Post-partum Haemorrhage—Inversion of the Uterus, &c.

For the purpose of this section the third stage includes the period from the birth of the child to the delivery of the afterbirth and the cessation of haemorrhage.

RETAINED AND ADHERENT AFTERBIRTH

The methods by which the placenta separates from the uterus and is expelled into the vagina, together with the signs which show that it has been expelled into the vagina, have been already given under the management of normal labour. There it was said that we base our practice mainly on the belief that the placenta is separated by a retro-placental haematoma. On account of this, in practice we only sink the hand just above the uterus, but do not rub or massage the fundus. Rubbing the uterus and squeezing it before the placenta has left the uterus is directly harmful, for (1) it may squeeze out the retro-placental haematoma, which is separating the placenta from the uterine wall, (2) it is a cause of irregular contraction of the uterus, which does not separate and expel the placenta as efficiently as the contractions of the uterus, when it is left to itself.

Frequency of manual removal of placenta. In the last six years, at the Rotunda, the placenta has been manually removed as follows:—

1903-4.	1,827 cases excluding abortions.	36 times.	1 in 51.
1904-5.	1,865 cases " "	26 times.	1 in 72.
1905-6.	1,838 cases " "	20 times.	1 in 91.
1906-7.	1,841 cases " "	18 times.	1 in 102.
1907-9.	4,050 cases " "	24 times.	1 in 169.
1909-10.	2,147 cases " "	17 times.	1 in 126.

Causes : I. Retention.

1. When chloroform has been given, the expulsion of the placenta from the uterus is often prolonged.

2. The feeble uterus of uterine inertia takes a much longer time to expel the placenta.

3. Early squeezing of the uterus with expulsion of the retro-placental haematoma leads to retention.

4. Irregular uterine contraction, due either to injudicious kneading of the uterus, the administration of ergot, a full bladder, or some unknown cause, fails to expel the placenta. Hour-glass contraction is a common cause of retention of the placenta.

II. Adhesion.

1. The placenta itself is adherent.

2. Adhesion of the membranes.

Diagnosis. When the placenta is still in the uterus an hour after the delivery of the child, we look upon the case as one of retained or adherent placenta. If the patient has had chloroform for a long period we wait for two hours. The cause can be determined only by manual exploration of the uterus. Retention is much more common than actual adhesion.

Treatment. If there is bleeding which is in excess of the normal and affects the patient, the case becomes one of post-partum haemorrhage, and the removal of the placenta is essential.

In an ordinary case, in which there is no alarming haemorrhage and the pulse is steady, let the patient alone for one hour unless the pulse is rising, or there are other signs of the onset of shock. After an hour profound shock is liable to occur even in the absence of haemorrhage. If it is decided to express the placenta rub up the uterus until it contracts well and then squeeze it as one would a lemon. If this fails wait for another pain and repeat. Stretch the cord at the same time to see if it lengthens. If this method fails further treatment depends on the condition of the patient and whether her uterus is the feeble one of inertia, is in hour-glass contraction, or has been rendered sluggish by chloroform, in which case wait a longer or shorter time

and try again. Manual removal may have to be undertaken eventually.

Hour-Glass Contraction.

This causes retention of the placenta and is apt to cause haemorrhage. The best treatment is the removal of the controlling hand and the administration of a hypodermic injection of morphine, gr. $\frac{1}{4}$. Under its influence the spasm passes off, the haemorrhage ceases, and the placenta can be expressed. Occasionally, on account of haemorrhage or shock, the placenta may have to be removed manually. Manual removal for hour-glass contraction should not be undertaken for two hours after delivery unless constitutional symptoms necessitate it.

Manual removal of the afterbirth.

Anaesthesia. The question of an anaesthetic depends largely on the patient. The manual removal of a retained placenta is not painful, but the removal of an adherent placenta is. Unless the patient is nervous, try at first tentatively without an anaesthetic.

Preparations. The aseptic precautions for manual removal of the placenta must be thorough. There is no rush of liquor amnii to flush away any bacteria carried from the parturient canal. Again, the area where septic organisms are most likely to be implanted, namely, the placental area, is the site of operation. Therefore get the patient into the cross-bed position. Having disinfected your hands and put on gloves wash the external genitals thoroughly with soap and water, pass a catheter, and give a vaginal douche. Lubricate one hand with soap and pass it in a cone shape up into the uterus.

Removal. The first difficulty that may be encountered is hour-glass contraction. This can be overcome by steady pressure with the fingers and counter pressure by the other hand on the abdomen. Then separate the afterbirth. To do this, get your fingers between the membranes and the uterine wall, and by keeping along the uterine wall sweep the fingers to and fro around the whole uterus between the afterbirth and uterine wall. Work from below upwards if

the placenta is on the posterior wall and from above downwards if it is on the anterior wall. Catch the placenta and pull it away. If it comes away entire in this way, be content, only examine the afterbirth carefully to see that it really is entire.

If it does not come away as easily as this, there is some adhesion between it and the uterine wall. We advise you to retain the rubber glove unless you fail to empty the

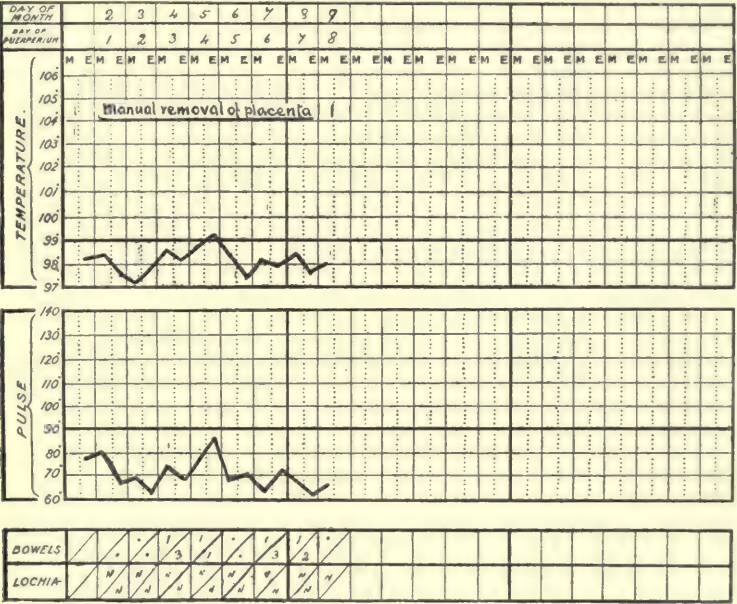


FIG. 123. Temperature chart after manual removal of placenta.

uterus completely. If in doubt about success with the gloved hand, take off the glove and soak your hand for two minutes in biniodide (1-1000). Then push your more sensitive, ungloved hand into the uterus. Again, get between the membranes and the uterine wall, if possible, and separate the placenta by pushing the fingers up between it and the uterine wall. Sometimes it is so adherent that it has to be scraped off while the uterus is steadied with the hand on the abdomen. Remove the placenta. But this is not sufficient. We advise you to put your hand up into

the uterus again and again, until satisfied that every bit of the afterbirth has been removed. Do not leave any membrane, for it forms dead material on which organisms may grow and cause intra-uterine sepsis. By taking a ball of iodoform gauze and rubbing the uterine wall with it, adherent membranes can be detached. We now in difficult cases use gloves, from which the tips of the four fingers have been removed, to permit the finger tips to work with greater effect. The hands are disinfected as thoroughly as possible, dried with a sterile wipe, and the nails are painted over with 'New Skin' after the glove is on and before they enter the uterus.

Following the removal of the afterbirth, give a hot intra-uterine douche through the large Bozemann's catheter in order to thoroughly wash the uterus. Drain with a wick of iodoform gauze.

POST-PARTUM HAEMORRHAGE

Of all conditions met with in the parturient woman, none is more urgent and more immediately dangerous to her life than post-partum haemorrhage; nor is there any condition which depends so greatly on the skill and promptness of the medical attendant.

Varieties. Post-partum haemorrhage is divided into primary and secondary. Primary—refers to haemorrhage that occurs within the first six hours after the birth of the child, and secondary—to haemorrhage that occurs later than this. Secondary haemorrhage is nearly always due to the same cause, namely, the retention of some piece of after-birth in the uterus. The treatment is the same as for primary haemorrhage. Hence, this arbitrary distinction between primary and secondary haemorrhage will not again be mentioned.

A more practical classification is into (1) TRAUMATIC, in which the haemorrhage comes from some wound of the parturient canal, and (2) PLACENTAL-SITE haemorrhage.

Haematoma vulvae. This is a form of traumatic haemorrhage in which the blood, instead of escaping externally, is effused into the tissues of the vulva. It is not a common

form of post-partum haemorrhage. Sometimes a haematoma forms before the birth of the child. The labia begin to be distended by a tense blue swelling. It may get no larger, or the patient may get very pale and show all the symptoms of loss of blood, whilst the swelling gets very large and may even burst and bleed externally.

Treatment. If it is small, let it alone. The blood will probably absorb. If after watching it for an hour or more it continues to increase in size, or when the woman's pulse begins to rise or other signs of loss of blood appear, incise it, let out the blood and pack the cavity with iodoform gauze. Remove the plug after twenty-four hours and let the parts fall together. If the haematoma suppurates, treat as an abscess.

In the rare cases where it forms before labour, deliver quickly. If it obstructs delivery by its size, incise, deliver, and plug with gauze.

See that the bladder is emptied by a catheter every eight hours as long as the cavity is tightly plugged.

Traumatic post-partum haemorrhage. The cervix, the vagina, the perineum, and the bulb, may all be torn and more or less profuse haemorrhage occur. Haemorrhage from the cervix will very rarely be so severe or continuous as to require stitching. Laceration of the vagina very rarely leads to much loss of blood. A tear of the perineum sometimes exposes vessels which continue to spout. Finally, a tear into the bulb at the side of the clitoris may result in a very dangerous haemorrhage.

How to diagnose between traumatic and placental-site haemorrhage. Remember that bleeding from the placental site is much more common than severe bleeding from a laceration. In bleeding from the placental site, the cause of the haemorrhage is that the contraction and retraction of the uterus is defective. The cause of this defect may be mere feebleness, but more frequently it is due to retention of a piece of afterbirth or blood clot, or to a full bladder. Whatever be the cause, the striking features are absence of proper retraction and contraction, and a large, soft, and flabby uterus. When it contracts, either spontaneously or

because it is rubbed up, blood and blood clots are squirted out by its contraction. This is quite different to the bleeding from a laceration. In this case the uterus is not large, and is hard and retracted. Yet in spite of this good condition, there is a free and continuous flow of blood. Again, when in the case of haemorrhage from the placental site the uterus contracts, the blood is squirted out, but the haemorrhage then ceases, whilst the uterus refills. When the haemorrhage is traumatic in origin, a contraction of the uterus does not appreciably affect its flow. Briefly, then, continuous haemorrhage is traumatic, intermittent is from the placental site. These rules should not be too strictly interpreted, for a contracting uterus to some extent diminishes the flow of blood from the cervix.

How to diagnose the situation of the bleeding laceration.

Treatment. If the uterus is found to be hard and there is a free flow of blood, put the patient in the left lateral position and see if she has a bad tear of the perineum or bulb of the vestibule. If so, quickly stitch the tear. If you are not sure that the bleeding comes from the perineum or bulb, wash the vulva, turn the patient into the cross-bed position and douche out the vagina with water so hot that it is uncomfortable when it flows over the forearm (115°-120° F.). Very often this hot douche temporarily and sometimes permanently stops the haemorrhage. Whilst the fluid is flowing, open the vulva and see if blood is flowing from it. This is not easy, for the flow of the douche obscures the view. Pinching the tube stops the flow. If the haemorrhage interferes still, push a pledget of cotton-wool wet with lysol up the vagina. This dams back the flow of blood and enables you to successively expose the bulb, perineum, and vaginal walls. If the perineum is bleeding, stitch it at once. Examine the bulb similarly on either side and stitch it, if the bleeding comes from a laceration there. If the bleeding is not coming from the perineum or bulb, hold the vulva open with your fingers and see if the vagina is lacerated. A vaginal laceration is usually due to a blade of the forceps. The hot douche suffices to stop vaginal bleeding. Finally, feel the cervix

with two fingers. You may be able to feel a laceration, and if the fingers are ungloved, the warm blood will be felt flowing over them. The hot douche nearly always stops bleeding from a torn cervix, but sometimes it may have to be stitched.

Stitching the perineum has already been described (p. 71).

How to stitch the bulb of the vestibule. Take a medium, fully curved needle, armed with either catgut or silkworm gut. Enter the needle a quarter of an inch internal to the inner side of the tear. Plunge the needle deeply into the tissues until it touches the pubes, then sweep it round and bring it out a quarter of an inch external to the outer edge of the tear. Do not include the clitoris, though its inclusion is of little moment. Put in as many sutures as necessary. The urethra is well out of the way, if the needle is directed towards the pubic bone. If the stitch is not inserted deeply, the surface only of the wound is brought together, and the woman bleeds into her own tissues. Watch for this. If a haematoma occurs, see if it increases hour by hour. If it does, open it, clear out the clots, and restitch more deeply and thoroughly. Plugging the cavity tight with iodoform gauze is another method of treatment, not so desirable as stitching. Remember, if you plug, to pass a catheter when necessary. It is difficult to keep this plug in position. The best way is to plug with gauze, cover this with an inverted pyramid of lint and keep the dressings on with a tight T bandage.

How to stitch the vagina. Open the vagina with the fingers. Stitch with a small curved needle and continuous catgut sutures, taking in the whole depth of the wound. These stitches tear out very easily as the vaginal wall is soft and oedematous.

How to stitch the cervix. In rare cases, the cervix may have to be stitched to stop the bleeding. Our rule is to stitch the cervix when we know that it has been badly torn, as when the os has been opened artificially by Frommer's or other dilating instrument. The cervical lips are oedematous immediately after labour, and this has been considered detrimental to primary union, but we have found the union

most satisfactory. Most observers would limit stitching of the cervix to those cases in which there is severe bleeding.

Use the half hand in the vagina as a posterior speculum and get an assistant to press on the fundus in order to bring the cervix well down into the vagina. Introduce the first suture by touch if the cervix is not visible. With a long needle-holder and a fully curved cervical needle pass a catgut suture through the posterior and then the anterior lip of the cervix. Pull the cervix out of the vagina with this suture, which does not tear as a bullet forceps is apt to do. Sew up the rent with interrupted catgut sutures, removing the first suture if it is faultily placed. This is known as Veit's method.

Post-partum haemorrhage from the placental site. The reason why bleeding takes place from the uterus is that the normal processes by which the uterus stops haemorrhage are lacking or inefficient. It is important to understand how bleeding is prevented in a normal case.

Natural means by which haemorrhage is prevented. The placenta forms, as it were, the inner wall to the placental area, where the uterus is riddled with large blood vessels and sinuses. Any bleeding which occurs flows from these torn sinuses, which are exposed by the peeling off of the placenta. There are three ways by which the bleeding is stopped naturally:—

1. By contraction of the uterus.
2. By retraction of the uterus.
3. By clotting of blood.

The corkscrew twist of the uterine arteries and V-shaped bend of the uterine veins also add to the efficiency of contraction and retraction.

Nature and importance of retraction. Retraction is a quality of uterine muscle that occurs separately from contraction. We can be sure that this is so, for when in Caesarean sections we come to stitch up the uterus, we notice that the muscle wall thickens, although it may remain flabby. Moreover, when this thickening of the wall occurs, bleeding from the cut uterine wall either lessens or ceases altogether.

Contraction is a temporary diminution in the length of muscle fibres. Retraction is a permanent diminution in the length of muscle fibre bundles. Before rupture of the membranes the latter can only occur by the formation of the lower uterine segment and the dilatation of the internal os. After delivery the cavity of the uterus is permanently diminished by retraction and in a normal case there is little, and sometimes no haemorrhage; it is this peculiar quality of the uterine muscle, the power of continued retraction rather than intermittent contraction, that stops haemorrhage. Therefore cases sometimes occur in which the uterus fails to contract and harden, as one would wish, and yet there is no bleeding. In these cases retraction, a quality independent of contraction, stops the bleeding.

At the same time a hard contracting uterus signifies a uterus in which both contraction and retraction are efficient. When, therefore, you lay your hand on the uterus, after the birth of the placenta, and find it hard and contracted, and that it remains firm, you know that bleeding cannot occur from the placental site.

Causes of post-partum haemorrhage from the placental site. The causes are—

1. Inherent inefficiency of the uterine muscle. This is rare. Even after marked primary uterine inertia, the retraction may be strong enough to prevent excessive haemorrhage, although contraction is very feeble. Haemorrhage due to this cause is known as *atonic haemorrhage*.

2. Anything within the uterus, namely, the whole or part of the placenta, membranes, or a large blood clot, interferes with retraction and contraction. *This is by far the commonest cause of post-partum haemorrhage.*

3. A tumour in the wall of the uterus or a full bladder interferes with contraction, and more especially retraction. *Full bladder must be always remembered as a cause of bleeding.* It is a simple cause, readily remedied, yet frequently overlooked. Haemorrhage due to the last two causes is called *pseudo-atonic haemorrhage*.

4. General diseases, such as haemophilia, Bright's disease, which carry with them a tendency to bleed freely.

5. The use of acids and acid drinks, particularly those containing citric acid, tend to cause haemorrhage, both ante and post-partum.

Signs and symptoms. A certain amount of haemorrhage accompanies the third stage in all cases. The average is said



FIG. 124. Bimanual kneading of the uterus.

to be under a pint. The haemorrhage that is called post-partum haemorrhage may be defined as that amount of loss of blood which causes constitutional symptoms in the patient. Sometimes a very little bleeding results in constitutional symptoms. In these cases, doubtless, shock (nervous inhibition) is an important factor.

Treatment. First stop the haemorrhage, whether the patient's symptoms are due to the amount of blood lost or the superimposed shock. It is difficult to gauge the

symptoms due to shock and those due to haemorrhage, therefore we advise all these cases to be treated on the same lines.

Haemorrhage occurring before the delivery of the after-birth. In these cases treatment is clear, namely, to pass a catheter, rub up the uterus, and express the afterbirth. If this fails remove it manually. Sometimes the blood comes away in a sudden large gush, so that quick action is necessary to stop the rush of blood. Put your gloved hand into the uterus and remove the afterbirth. Plunge the hand in again and knead the uterus bimanually. Then give a hot intra-uterine douche.

In the case of sudden and severe outpouring of blood, it is necessary to stop the haemorrhage promptly or the patient will die. This knowledge emphasizes the value of having a sterilized glove ready for use.

Haemorrhage occurring after the delivery of the after-birth. Urgent cases with a rush of blood. Here adopt the same treatment as in cases when the afterbirth is still in the uterus. Plunge a gloved hand into the uterus, clear out any remnants of afterbirth, and pommel and knead the uterus bimanually until it hardens. Then give a hot intra-uterine douche, or, better still, give the hot douche first.

Cases that are not of extreme urgency. The majority of cases are of this nature. The bleeding does not stop, the patient gradually becomes pale and the pulse more rapid.

Our order of treatment is as follows, the patient being on her back. First we sink the ulnar surface of the hand deeply into the abdomen so as to surround the fundus with the palm and then rub up the uterus to a contraction. This distinguishes placental site haemorrhage from that due to lacerations. At the same time we pass a catheter with the other hand. If bleeding continues the patient is quickly placed in the cross-bed position. The douche has already been prepared for emergency and the nurse has filled it up with hot water from the kettle, until the douche fluid of creolin (5j to Oj) is uncomfortably hot to the skin.

Putting on the vaginal nozzle we douche out the vagina, and, whilst douching, pass the catheter by sight, if we failed before.

If the bleeding still continues the glass nozzle is removed quickly and a large Bozemann's catheter substituted. This is passed into the uterus, guided by the half hand in the vagina, and the uterus is douched with very hot fluid, even letting it burn the patient slightly. If this douche stops the bleeding it is continued for a little while. Then the afterbirth is carefully examined. If it is entire we are content. If a piece of placenta or membrane has been left behind in the uterus, it is removed at once and the uterus again douched.

The douche fails to stop the haemorrhage. The hand is put into the uterus and any piece of membrane or placenta removed. We repeat this until we are sure that the uterus is quite empty, as in manual removal of the placenta. If the membranes are very adherent we roll up a ball of gauze and wipe over the uterine wall with this. The membrane comes away in strips by this means. If bleeding continues, we knead the uterus bimanually until it contracts.

If intra-uterine kneading does not stop the bleeding. This is a case of true atony, and we are then driven to our last expedient, namely, packing the uterine cavity with iodoform gauze. For this purpose nothing is more convenient than Dührssen's tin of sterilized iodoform gauze, and we advise that one of these should always be carried. It contains a strip of gauze six yards long and three inches wide, and also pledgets of sterile cotton-wool.

To plug, we insert the half hand in the vagina as a posterior speculum. The nurse opens and holds ready the tin of gauze. The uterine cavity is packed by carrying the gauze through the cervix up to the fundus with the hand or the plugging forceps. Having plugged the uterus we leave one end of the gauze protruding through the cervix and pack the vaginal fornices with the pledgets of cotton-wool. This elevates the uterus, and we then strongly anteflex it over the pubes, keeping it in this position by a pad, sunk deeply into the abdomen so as to rest on the posterior uterine wall. This pressure approximates the anterior and posterior uterine walls which are now separated only by the plug.

In practice this stops the haemorrhage and theoretically it could not do otherwise. The binder keeps it in this position. It will be noted that the abdominal hand and the binder press the atonic uterine walls against the plug and it is therefore not necessary to use a great quantity of gauze. We remove the plug in twelve to twenty-four hours.

At one time this treatment met with condemnation mainly on theoretical grounds, which were that the amount of material required to plug an atonic uterus would be enormous, but experience has proved its value. We have found it is easy to do, and it always stops the bleeding. We would insist on the fact that the uterus, however flaccid, invariably contracts on the gauze when introduced into its cavity, thus the quantity of plugging required is usually small, and the result immediately satisfactory. We keep the cervix open by allowing a piece of gauze to protrude through it, on the ground that when the cervix is dilated the body of the uterus contracts, and vice versa (polarity of the uterus).

Ergot. Ergot has been omitted, not because it is not of value, but because other measures are far more important. It is useless to give drugs by the mouth to collapsed patients. Either absorption is very slow or the patient vomits. We give, as soon as there is time, ergotinin citrate (gr. $\frac{1}{30}$) or infundibulin (1 c.c.) as a hypodermic injection deeply into the buttocks. In extreme shock intramuscular injections are absorbed comparatively slowly. Therefore intravenous injections of ernutin (1 c.c.) or infundibulin (1 c.c.) will act more rapidly.

Ergot has two effects—(1) it tends to make the contractions of the uterus tonic, (2) it makes the muscles of the arteries contract, and raises the blood pressure.

Other methods of stopping severe post-partum haemorrhage. (1) Severe bleeding can be stopped by direct pressure on the aorta from the abdomen. We have used this pressure in urgent cases, until other expedients were available.

(2) Another method of stopping urgent bleeding is by

bimanual compression of the uterus between one hand in the vagina and the other on the abdomen.

(3) Pull the fundus of the uterus down towards the pubes, and keep it acutely anteﬂexed. This will usually stop bleeding. It is a good way to gain time to prepare for other measures, but it causes some discomfort to the patient.

After the bleeding has been stopped. Treatment is now that for shock. A full account of this has been given under ante-partum haemorrhage (pp. 131-5).

Summary of the treatment of post-partum haemorrhage.

If very urgent either compress the aorta or plunge the hand into the uterus, remove the afterbirth or remnants of afterbirth, if any, knead the uterus between the intra-uterine and abdominal hands until it contracts, and then give hot intra-uterine douche and ergotin in gr. $\frac{1}{50}$, ernutin 1 c.c. or infundibulin 1 c.c.

If not so urgent proceed in the following order if the bleeding fails to stop:—

1. Rub up the uterus and make it contract, thus deciding whether the haemorrhage is traumatic or atonic in character.

2. Pass a catheter and express the placenta?

3. Hot vaginal douche.

4. Hot intra-uterine douche.

5. Manual exploration of the uterus, with removal of any remnants of afterbirth or blood clot, followed by—

6. Intra-uterine kneading of uterus.

7. Plugging the uterus with iodoform gauze.

8. Ergotin in citrate (gr. $\frac{1}{50}$) or infundibulin (1 c.c.) into the buttocks.

9. The treatment for the restoration of the patient from collapse.

10. Long watching by the bedside for fear of further haemorrhage or recurrence of symptoms of shock.

We no longer use or recommend iron. When used in strong solution septic infection or pulmonary embolus frequently followed. If used at all, the strong solution of perchloride of iron should be poured into hot water until it is the colour of weak tea and this mixture used for an intra-uterine douche.

INVERSION OF THE UTERUS

The sudden turning inside out of the uterus is extremely rare.

Causes. It is known to have followed pulling on the cord, pressure on the fundus, and is said to have followed precipitate labour. It may occur without any perceivable reason. In order to occur, the uterus must be in a partially atonic condition and the placenta situated on the fundus (Atthill).

Result. Great shock, which remains as long as the uterus is inverted and is quite independent of haemorrhage. Occasionally shock is entirely absent.

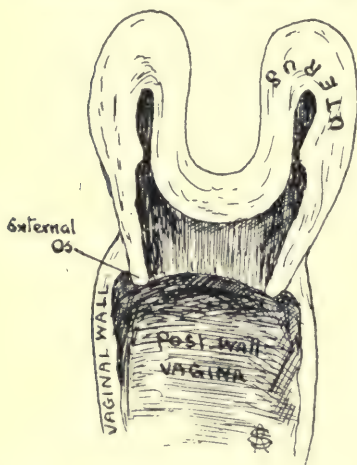


FIG. 125. Partial inversion of the uterus.

Diagnosis. Sudden shock of the patient leads to examination. On palpating the abdomen you find either that the uterus has disappeared or that the fundus has dipped down, like a cup. Sometimes the uterus appears when the lips of the vulva are opened or it may even come out through the vulva. By vaginal examination the uterus may be felt as a rounded mass sur-

rounded by the cervix into which the finger can be passed for a short distance only.

Treatment. Use the whole hand to push the uterus back. If the placenta is adherent, push the uterus back and then separate the placenta. If this is impossible, peel off the placenta and then push the uterus into its proper shape and position. To push back the uterus reduce it in much the same way as a hernia. Squeeze the fundus with all the fingers and at the same time push it upwards.

Another method is to pass the finger into one groove at the side of the uterus and push upwards, and then into the

other groove and push upwards. In this way, the inversion is gradually reduced.

SUDDEN OR RAPID DEATH AFTER CHILDBIRTH

1. **Haemorrhage** is the most common cause.

2. **Shock**, by which is meant some profound nervous depression, whether it lead to vaso-dilatation, syncope, or other physiological change. One of our patients with hydramnios collapsed suddenly just after rupture of the membranes and died in a short time. The membranes were ruptured artificially after they had appeared at the vulva.

3. **Pulmonary embolism.** An embolus plugging some part of the pulmonary artery leads in most cases to death. It may occur any time after the child's birth up to late in the puerperium. It is more frequent after than before the tenth day. Sometimes pulmonary embolus leads to sudden death. The onset of the condition is terribly sudden.

It certainly occurs in septic more often than in normal cases, and it is probable that it will not happen unless there has been some infection.

Signs and symptoms. The sequel of events is usually as follows. The patient is suddenly seized with dyspnoea and a violent pain in the chest. She falls back, if she is sitting up or in any way exerting herself, and begins to gasp for breath. Her chest heaves convulsively, her face is first livid and then pale. She urgently demands that the window be flung open so that she may have air. The pulse is rapid and may be uncountable.

If the chest be examined it will be found that no air is entering the greater part of the affected lung.

After a short or prolonged struggle the patient sinks into unconsciousness, in which state she may remain for several hours before death or recovery.

If she recovers, dyspnoea is apt to return with slight exertion. She may have a series of similar attacks resulting eventually in death, or recovery ensues.

Treatment. The damaged lung cannot be put to work again. All that can be done is to give free access of air and free use of the respiratory muscles. Open the windows and

doors of the room. Take all weight of the clothes from the patient's chest. Give nothing by the mouth, for a gasping patient is likely to choke. Let a very gentle stream of oxygen flow through a tube placed in the patient's mouth. Give a hypodermic of strychnine (gr. $\frac{1}{20}$) and repeat this every two hours. Ammonia, atropine, and morphine, may all be used.

4. **Air embolism.** Aspiration of air into the uterus and its entry into the veins is said to cause death. Many of these cases have been shown to be due to the formation of gas in the blood after death by the bacillus aerogenes capsulatis. There is a good deal of scepticism on this question of air embolism, though in rare cases it seems to have been the cause of death.

5. **Inversion of the uterus.** This also produces a sudden diminution of intra-abdominal pressure, but marked atony of the uterus, such as precedes inversion, is itself accompanied by shock.

CHAPTER XIV

OBSTETRICAL OPERATIONS

DOUCHING

Indications. Douching has already been fully described on p. 94. The only points that need here be mentioned are the indications for vaginal douching during the conduction of labour.

Before the birth of the child. Vaginal douches.

1. If there is any reason to think the vagina is septic, for example if a midwife of doubtful cleanliness has made a vaginal examination.

2. If there is, or has been, a purulent vaginal discharge.

3. Before any obstetric operation.

In private practice, where we are sure of cleanliness, we sometimes put on forceps without a previous vaginal douche, provided the vagina is moist and the temperature not raised. There are minor difficulties in its employment although these should have no weight, where the advantage of douching is clear. But with a cleansed vulva, a clean patient, and sterile forceps, the advantage of douching the vagina is doubtful. After the birth of the child the liquor amnii will douche the vagina.

4. To relax a rigid os and in primary uterine inertia.

After the delivery of the afterbirth. Intra-uterine douches are to be used.

1. When any intra-uterine operation has been performed.

2. To stop bleeding from the uterus.

VERSION

Version has been fully described on pp. 138-44.

INDUCTION OF PREMATURE LABOUR

Has been described on p. 291.

FORCEPS

Inexperienced obstetricians attach too much importance to the method of applying forceps. The application is not really difficult. To know the proper time to apply the forceps is most important. When difficulty is met in applying, the propriety of the application is open to question.

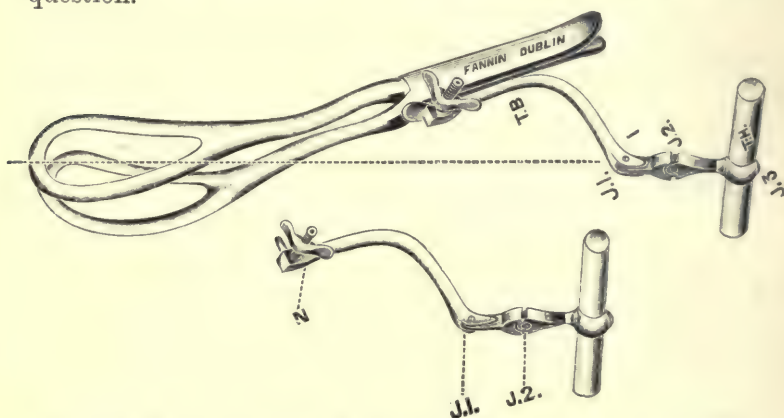


FIG. 126. Barnes' forceps with Neville's axis tractor. T.B., axis-tractor bar; J.1., joint 1; J.2., joint 2; J.3., joint 3; T.H., handle; N, screw and pin for fixing axis-tractor to forceps.

The instrument. A forceps is an instrument consisting of two blades with handles, which lock. The best form of lock is the English lock. Each blade has a pelvic and cephalic curve. The blades should not be too springy, too close or too far apart, when the forceps is locked. If too close they mark the foetus unnecessarily, if too far apart they slip. Our own forceps measures $\frac{5}{8}$ inches between the tips and $3\frac{1}{4}$ inches at the greatest width.

Choice of forceps. Practically any long forceps with axis traction can be used. We use Barnes' forceps with Neville's axis-tractor. It possesses the following advantages:—

1. It is applied as an ordinary long forceps and the axis-tractor is fitted outside the vulva after the blades have been

locked. The complication caused by an axis-tractor, when the blades are being fitted, is avoided.

2. As the axis-tractor is outside the vulva, there are no grooved surfaces or locks, which are difficult to keep clean.

3. When the blades are in position and the axis-tractor fitted, they are kept in position. The hands are then freed, if necessary for giving more chloroform or other purpose, without fear of the blades falling out or shifting.

4. If attention is paid to the arrow mark on the instrument, one is always sure of pulling in the direction of the axis of the pelvis.

Indications for forceps. Forceps are not so frequently applied as formerly. When indicated they are invaluable. When not indicated their use may be dangerous and add to the difficulties and dangers of the case.

Forceps delivery is permissible only when the following conditions are fulfilled.

1. The os should be fully dilated, so that its rim cannot be felt with a finger in the vagina. If the anterior lip is felt but can be pushed up and the rest of the os is drawn up above the largest diameter of the child's head, forceps may be applied. Its application before this leads to tears of the cervix, which may result in haemorrhage and sepsis. Later, as a consequence of the cervical tear there is the risk of uterine prolapse.

2. The head should be fixed in the brim by its largest diameter. Determine this by the fourth grip of abdominal palpation, by the absence of any overriding of the pubes by the child's head, and by vaginal examination.

3. The bladder should be empty.

4. The membranes should be ruptured.

5. The head should be fixed in a proper position. Thus anterior parietal presentation or face with the chin behind would be improper positions.

With these primary indications fulfilled, indications for forceps are the signs, either maternal or foetal, which call for rapid delivery.

The following indications for rapid delivery are also indications for forceps with the above conditions fulfilled.

A. Signs of danger to the child.

1. The foetal heart between the pains is counted below 120 or above 160. This suggests foetal distress, more particularly if a slow foetal heart-beat is heard as a sequence to a rapid foetal heart-beat.

2. Meconium, unmixed with liquor amnii, is coming away and the head presenting. This suggests that the child's life has been in danger at some time, although not necessarily at the time when the meconium is seen.

3. Tumultuous foetal movements noticed by the mother or doctor. These precede death of the foetus.

4. When there is a large caput succedaneum. This shows that the child's head is being subjected to great and prolonged pressure.

5. When the head is fixed and the cord prolapsed.

B. Signs of danger to the mother.

1. Heart disease or lung disease, acute or chronic, call for as short a second stage as possible.

2. Typhoid or other severe fevers.

3. Acute chorea.

4. Atheroma of the blood vessels, with or without paralysis.

5. Accidental or unavoidable haemorrhage.

6. Eclampsia.

7. Forceps, or some other mode of rapid delivery, is urgently called for, if there are any signs of threatened rupture of the uterus.

8. Prolonged labour affecting the mother, as shown by a rising temperature and pulse with or without a hot and dry vagina. A temporary rise of pulse without rise of temperature is often due to nervousness and is without significance.

Exhaustion due to want of sleep or the tardiness of primary uterine inertia are not indications for forceps. Nor is a slight degree of contracted pelvis, unless other signs arise. Nor again want of proper flexion of the head. For example we recently had a primipara who delivered herself of a full-term child with brow presentation after a second stage of fifteen minutes.

9. If the second stage has lasted longer than two hours, with a first or second vertex presentation, forceps may be

applied to save the mother unnecessary suffering, although a further delay would be without danger to her or the child.

Position. In private practice, when little or no help can be obtained, the left lateral position is the best. The patient's back is parallel to the head of the bed. Her buttocks are well over the edge, her thighs and legs fully flexed to prevent her falling out of bed. It is im-



FIG. 127. Left lateral position of patient for forceps. Also side position for a vaginal douche. When douching, two fingers of the left hand should be in the vagina.

portant to obtain this position exactly. If the patient's back is not parallel with the head of the bed, it will be awkward to put on forceps. Place a chair opposite the patient's buttocks, for it is easier to put on forceps whilst sitting down and at the right level. There is a mackintosh passing from under the patient and dipping into the bath; your waterproof apron also dips into the bath and covers your knees. The instruments, namely forceps, tongue forceps, swabs of wool, catheter and vaginal nozzle, are in a basin of warm lysol to your left on a table. The douche is on a chair or stool placed on the table. There is also a small bowl in which is some soap with a little lysol to which is added boiling water.

The nurse sits on the bed at the patient's back.

The need of chloroform. Sometimes in private we are able to fit the forceps and keep them in position by the axis-tractor, take off the gloves, put them in biniodide, give the patient chloroform to full anaesthesia, cleanse our hands, put on the gloves again, and deliver the patient whilst she is coming round from the chloroform and the uterus is contracting.

In many cases, especially when the head is low down, applying forceps through the stretched vulva causes little or no additional pain.

In other cases we get the patient into position, give her chloroform to full anaesthesia, sterilize our hands, and apply the forceps. We deliver when she is lightly anaesthetized, directing the nurse, if need be, to drop a little chloroform on the mask, to keep her lightly under. The choice of these two methods depends on the ease with which we think forceps can be applied and the intelligence of the nurse. But as a general rule it will be found well to give an anaesthetic while applying the blades of the forceps. If the patient's circumstances permit it, a special anaesthetist is obtained.

Preliminaries to application. The external genitals are cleansed, the hands washed and rubber gloves put on, the bladder emptied, the vagina douched, and a final vaginal examination made to make sure that the membranes are ruptured, the os fully dilated, the head fixed in a proper position and by its largest diameter in the brim.

Application. First take the lower or left blade in the right hand. It can be distinguished from the upper blade by holding it with its concavity looking upwards. Its pelvic curve will then correspond to the curve of the patient's sacrum. It is held, in fact, in the position which it will assume when fitted to the child's head. The nurse now clasps her hands round the patient's right thigh and raises it a little. Dip your left gloved hand into the weak lysol, which lubricates it, and pass it into the vagina. Pass the fingers up between the child's head and the hollow of the sacrum, where there is always room. Pass the half hand as

high as possible and make it lie, with the back of the hand and fingers along the curve of the sacrum and the hollow of the palm looking forwards. The half hand performs two functions, (1) it opens the vagina like a posterior speculum and presses the perineum back, (2) it forms an intelligent



FIG. 128. Applying the lower blade of the forceps.

posterior pelvic wall, aware of the progress and position of the blade and of any obstruction, such as a hand by the side of the head or a projecting sacral promontory, to the progress of the blade.

Take the lower or left blade and direct its upper part almost at right angles into the palm of your hand in the vagina. To do this hold the handle up between the patient's thighs close to the pubes. Direct the blade, in

fact, as if you wished to push it through your hand in the vagina into the rectum. Then run the blade up along your hand, keeping its upper end pressed into the palm so as to prevent its striking on the foetal head. Pass it as high as possible, burying it, so to speak, in the vagina, with its cephalic curve in apposition to the palm and fingers of your hand in the vagina, with the concavity looking forwards.



FIG. 129. The lower blade of the forceps, as a posterior blade, before twisting.

Make no attempt to turn it into its lateral position, until it has reached the highest point possible. If the head is high up in the pelvic cavity, it will be necessary in the latter part of the blade's ascent to press the handle well back against the perineum. This enables the blade to ride up along the sacrum until its upper part reaches a little above the sacral promontory. The blade is now sufficiently high. It lies all along the sacral curve, its upper part

a little above the sacral promontory. It is, in fact, a posterior blade.

To make it take a lateral pelvic position—that is to make it the lower blade, when the patient lies on the left side, simply twist the handle outside the vulva, so that the surface of the handle which looked forward now looks upward. The blade in the vagina follows this twist, and the concavity of its cephalic curve, which looked forward, now looks upward. This is its proper position.

If it does not do so, the fingers in the vagina feel for and discover the reason. Common causes for this are that the blade is stopped from full ascent by a projecting sacral promontory, as in flattened pelvis, or is prevented from turning by catching in a fold of the scalp or an overlapping suture. In these cases make the hand in the vagina direct its progress over the promontory or away from any other obstruction. If this is impossible and the forceps will not slip right up as a posterior blade, turn it and let it make the rest of the ascent as a lateral blade, which it will readily do. In short, your hand in the vagina will indicate what is wrong, and a little ingenuity will set matters right. When the lower blade is in the right position, the handle is pressed well against the perineum. Keep it in this position by putting the shank under the ulnar edge of the hand in the vagina. This enables an important rule to be followed, namely, to introduce the upper blade above and in front of the lower blade. If the upper blade is passed behind and below the lower shank, hopeless confusion results. Do not remove your hand from the vagina. It keeps the lower blade in position, prevents its slipping about, and is just as useful for passing the upper blade as the lower.

Passing the upper blade. Pass the upper blade at first precisely as the lower blade, that is to say, make it a posterior blade. When its upper part reaches a little above the sacrum, in other words when it is buried up to the handle in the vagina, with the handle pressed well back against the perineum, change it to an upper blade by twisting its handle outside the vagina, so that the surface which looked forward now looks downward. The blade in the

vagina follows this movement, and the cephalic curve, which looked forward, now looks downward. If any difficulty arises in turning the blade, deal with it in precisely the same way as with the lower blade; to press the blade away from the foetal head, lower the handle a little while twisting it.



FIG. 130. Passing the upper blade of the forceps.

Locking the forceps. The two blades are lining the lateral pelvic walls with the foetal head between them. Now lock the forceps. Hold the upper blade in position with your right hand. Withdraw your left hand from the vagina, keeping its ulnar edge deliberately pressed down on the shank of the lower blade to prevent it shifting from its

position. Catch the handle of the lower or left blade with the left hand as soon as you have withdrawn it.

The English lock is locked in the following manner: The two flat surfaces of the handles of the forceps are facing each other. They have to be brought into apposition. Pass the handle of the upper blade down in front of, then underneath, and finally up to the handle of the lower blade. The method of locking is then obvious and should naturally result.

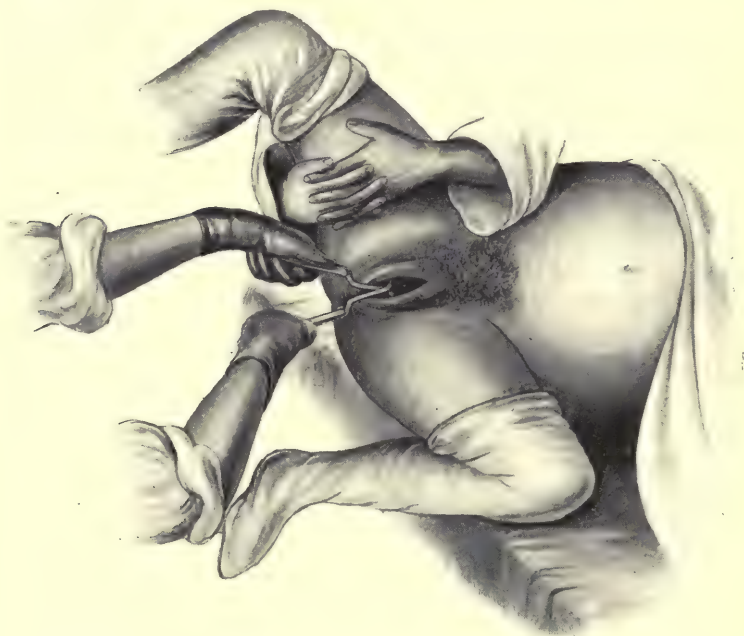


FIG. 131. Locking the forceps.

If they do not lock, twist the handle of the blade that seems out of place, but do not use force. If this does not do, pass the left hand again into the vagina and direct one or both blades into the lateral pelvic position. It is not necessary to withdraw the blades and reapply them. Now fit the Neville axis-tractor and the blades are held safely in position and cannot fall apart.

The question of fitting the forceps to the pelvic cavity or

to the foetal head. In this description of applying forceps, we have taken no notice of the position of the foetal head. The best position of the forceps on the foetal head is when each blade fits over an ear. Fortunately this is usually the case, for the occiput rotates to the front. If the head has not rotated properly the foetal face is turned to one lateral pelvic wall, the occiput to the other. The consequence is that by our method one blade fits over the eye and the other behind the ear. Many obstetricians object to this, and in these cases make one blade anterior, the other posterior, so that again each blade encloses an ear. The shape of the forceps is not readily adapted to this position and vaginal lacerations are consequently more liable to occur. It is also a more difficult procedure, and we do not think it has any marked advantages to compensate for the increased difficulty.

Forceps with an unrotated head. Apply the forceps as we have advised (pp. 324-9). With descent of the head rotation occurs, and the blades from being lateral tend to rotate to the front and back. These positions are unfavourable for delivery, as the blades stretch and tend to rupture the vulval orifice, therefore reapply. First get the nurse to press from the abdomen down into the pelvis on the head and maintain this pressure, whilst the forceps are reapplied. Unless she does this, the head slips back again and resumes its unrotated position. Take the blades off and reapply as lateral blades, enclosing either ear.

How to pull. The patient must not be deeply under the anaesthetic when you pull, as deep anaesthesia tends to interfere with uterine contractions, and there may be serious post-partum haemorrhage. When the degree of anaesthesia is quite light, the contractions of the uterus help delivery and prevent subsequent post-partum haemorrhage.

The nurse sits between the back of the patient and the head of the bed. She clasps the right thigh with her hands in a firm grasp, and whilst you pull she forms a counter resistance.

Hold the handle of the axis-tractor and carefully watch the arrow and indicator to see that the traction is in the right direction. If the forceps is slipping it is easily recognized. Put two fingers of one hand on the head and

pull the axis-tractor handle with the other hand. If the blades are slipping there will be no advance of the head with the forceps. Unlock and push the blades up higher, or else reapply them.

In pulling, use sufficient force to gradually bring the child down. The traction should be intermittent, to simulate as closely as possible the action of the natural pains. Loosen the blades when not pulling. At times, with the unconscious patient in the left lateral position, and in spite of the efforts of the nurse, the buttocks of the patient are pulled round and you cannot pull any longer without climbing on the bed. If, therefore, traction begins to prove hard, get the patient on her back. The nurse goes to the other side of the bed and holds the patient firmly under the armpits to prevent her being pulled out of bed. Sometimes when the head advances with difficulty, one can make it progress better by rocking the forceps a little from side to side or up and down while pulling. A similar action is used in getting a tight cork out of a bottle. Furthermore in these cases if the pull is difficult tilt the bed a little on one side by putting books or blocks under the side legs, so raising the buttocks above the head. The body weight now opposes the pull of the forceps. If the legs are allowed to hang towards the ground, Walcher's position, with its increase in length of the true conjugate, is obtained.

When the head is on the perineum. Some authorities advise that the blades should be removed and the head delivered by natural pains. The blades add little or nothing to the bulk of the head. It is convenient, however, to change one's position, if the woman is in the left lateral position. Stand up and pass your left hand from the abdomen between the patient's thighs and catch the forceps with this hand. Remove the axis-tractor. Now direct the progress of the head. If it advances too quickly press the forceps back, if too slowly pull gently, directing the handles up towards the woman's abdomen. When the head is actually stretching the vulva the mother sometimes 'breathes it out', the head advancing with each inspiration. Nothing could be better than this, for the more deliberately

and gradually the head advances, the more perfectly does the perineum roll back over the head, and rupture is mitigated or avoided. During this last stage delivery can be greatly facilitated by pressing with the right hand behind the anus and in front of the coccyx.

When the head is born. Remove the forceps and manage the rest of delivery as in normal labour. Sometimes the child's face is white, the pallor of white asphyxia. When this is the case deliver at once. After delivery of the child, provided it is all right, hold open the perineum, and, if it is torn, stitch it before the patient comes round from the chloroform.

As in all cases in which chloroform has been given for some time, the third stage is likely to be prolonged. Provided the woman does not bleed and has no shock, there is no harm in allowing the uterus two hours to expel the placenta into the vagina.

Dangers to the child. Over and above the occurrence of asphyxia neonatorum, a difficult forceps delivery is not without danger to the child. Meningeal haemorrhage may occur and lead to convulsions and death. Idiocy and some form of birth palsy may follow. Deformities or indentations of the skull as a rule pass away in a few days.

Depressed fractures are more serious. Dr. Munro Kerr has practised with success a simple method of restoring a depressed fracture. He places the child's head between his knees and compresses it in a direction opposite to that in which the long axis of the fracture lies. In this way the fracture is forced out. We have succeeded in doing this on artificially produced depressed fractures in dead children, but not in a live child, probably because we have not used enough force.

On the other hand success has uniformly attended the following safe and simple method. The sharp point of one blade of a bullet forceps is bored through the bone at the centre of the fracture. The point must be sharp, else the depression is increased. The shank is then turned at right angles to the bone, and the depressed fracture pulled steadily into position. This can be performed safely up to the end of the first year at least.

Facial paralysis may result. It recovers commonly in a day or two. If it persists, it must be treated by electricity.

CAESAREAN SECTION

When Caesarean section is performed under favourable circumstances, it is amongst the easiest and safest of abdominal sections. On the other hand when performed after a woman has exhausted herself with efforts to bring about an impossible delivery, or many attempts have been made to deliver per vaginam, it becomes very dangerous. It is important, therefore, to be able to recognize the indications for Caesarean section—and fortunately this is easy to do—as early as possible, and to decide finally on its advisability.

Indications. The indications have already been discussed under contracted pelvis, pregnancy with tumours, and cancer. The only other indication is death of the mother, when an immediate operation may be done to save the life of the child. Twenty minutes after the death of the mother is usually given as the time limit.

Time of election. The best time to perform Caesarean section is in the early stage of labour, and certainly before the rupture of the membranes. Operation before the onset of labour has been advocated, but when possible it is better to wait until labour starts. The patient is not fatigued by the pains of labour; contraction and retraction of the uterus, which prevent post-partum haemorrhage, are assured, and the os is sufficiently open for free drainage. Therefore immediately the patient falls into labour make preparations for the operation. In fact, decisions as to the general arrangements, the room, the table, the nurse, the assistants, must all be made in the last months of pregnancy.

In general practice it may not be possible to be ready quickly. We have performed the operation towards the estimated end of pregnancy without waiting for the onset of labour, to avoid having to undertake the operation at night. Results go to show that Caesarean section can be undertaken safely before labour has set in. Contraction and retraction of the uterus are efficient, and drainage can

be ensured by pushing the finger from the uterus through the cervix during the operation.

Preparation of the patient. Give the patient a warm bath, if there is time. Give an enema to empty the bowel. If possible the patient should not have had any solid food for six hours, but this is not always possible. The danger from vomiting during the operation is not so great as that from delay. Empty the bladder by a catheter after cleansing the vulva, and just before the operation.

Preparation of the skin and vagina. The pubes is shaved. Wash the abdominal skin with soap and water, paying special attention to the umbilicus and pubic region. Wash off the soap with plenty of water. Rub the skin over with ether to get rid of fat, and put on a lint compress of biniodide of mercury (1-2000) dissolved in methylated spirit 70 per cent. and water 30 per cent. This disinfects the superficial layer of epithelium. At the same time the alcohol hardens the epithelium and prevents it being macerated and rubbed off during the operation.

The room. Failing a properly equipped surgical theatre, any clean and well lighted room will do. Should the operation have to be undertaken at night, good artificial light is essential, for nothing is more likely to lead to disaster than poor light. Two lamps and plenty of candles will suffice, but it is well not to be sparing in the number of candles. Unless the artificial light is electric, avoid ether, for the vapour catches fire with extraordinary readiness. Even if the anaesthetist uses chloroform, the anaesthetic of choice, the room must be well ventilated, for an artificial light near chloroform forms carbonyl chloride, which will act as a respiratory irritant. A deal kitchen-table covered with two or three blankets, a mackintosh, and a sheet from below up, forms the operating-table. In preparing a dusty room there is great danger in disturbing the dust. To avoid this wring out sheets in corrosive sublimate solution and spread them over dusty furniture, tops of presses, &c. Wet sawdust sprinkled on the carpet will render sweeping safe. As a further precaution the broom used should be kept moist with corrosive sublimate solution,

and all dusting should be done with a towel wrung out in an antiseptic solution.

Instruments. The minimum of instruments needed is—
1 sharp scalpel.

12 artery catch forceps, either Spencer-Wells or Kocher's.

1 pair of straight scissors with rounded ends.

1 or 2 bullet forceps.

Curved needles from medium sizes to large in gradation.

1 straight skin needle. (An ordinary glover's needle is sharper than a surgical needle.)

1 needle-holder.

Silk thread for sutures, No. 2 and No. 3 size, disinfected by boiling for ten minutes on two occasions in 1-1000 corrosive sublimate solution, and kept in this solution.

A few pieces of silkworm gut sterilized by boiling for suturing the skin.

Gauze sponges or wipes in bundles of ten, so that they may easily be counted, and a long roll of plain gauze; these should be brought ready sterilized.

Sterilization of instruments, &c., at the house. The basins, in which the instruments and wipes are placed, are too large to be boiled. We wash our hands and scrub the basins inside and out with Monkey-brand soap, or with ordinary soap and a boiled nail-brush. Flush this soap away by holding the basin under the tap. Finally, sink the basin in a bath of corrosive sublimate (1-1000). We look upon the cleansing of basins before all obstetric operations as an essential precaution.

The instruments are boiled in weak lysol (or soda solution to prevent rusting) in a fish-kettle. They can well be kept in the fish-kettle, which forms a sterile dish for them. They are boiled for twenty minutes. The knife is blunted by prolonged boiling. Wrap it in wadding and boil for three minutes. Use rubber gloves, boiling them in water and then soaking them in a basin of methylated spirit.

During the operation, have the instruments in basins in plain boiled water.

Assistants. Three assistants at least are necessary. One gives chloroform, a second assists during the operation, and

a third attends to the instruments and takes the child, when the cord is tied and severed. A fourth assistant is useful, for he can take the child and the third can help throughout the operation.

Cleansing of the hands and forearms of the operator and two assistants. We use rubber gloves, and for fear that they may be torn or punctured during the operation, we adopt a slightly different method of sterilizing our hands from that employed in ordinary obstetrics. Pare the nails, wash the hands and forearms with soap, water, and boiled nail-brush, each person having separate basins, soap, and brushes. Wash off the soap and immerse the hands and arms in a solution, equal parts of 70 per cent. methylated spirit and biniodide of mercury solution 1-1000 in water. Experience has shown this spirit solution of biniodide of mercury to be a very efficient, if not the most efficient, solution for disinfecting and hardening the skin. If gloves are now put on, the biniodide solution is locked up and corrodes the hands. If the disinfectant is washed off with water and the gloves put on, the epithelium macerates with the warmth, and a septic perspiration collects in the gloves, which is dangerous if it escapes from a puncture of the glove during the operation. We, therefore, wash off the antiseptic by rinsing in a basin of methylated spirit. The gloves are in a basin of methylated spirit. They slip on easily. The spirit prevents sweating and maceration of the epithelium, and we have found the glove contents to be sterile after operations of two hours' duration.

Wear clean aprons or overalls. A clean waterproof apron will do, for if boiled and dried folded, the folded-in surface is sterile. In hospital we wear dry sterilized overalls with long sleeves, over the cuffs of which we turn the gloves. We also wear sterile caps and mouth bags.

Position of the patient, surgeon, and assistants. In the absence of an operating-table which permits of the ordinary gynaecological position, pull the patient, when under chloroform, to the end of the table, so that her legs hang over the edge. Tie them loosely in this position. Stand between the legs of the patient, for this is a convenient

position at first, but many prefer to stand on the right side. If the operator stands between the legs, an assistant stands on either side.

Preparation of the area of operation. Remove the compress and wipe the abdominal skin with a sterile sponge soaked in ether and held by forceps, so that the glove does not touch the skin. Follow this with biniodide of mercury in spirit, and finally paint the whole surface of the abdominal skin with a saturated solution of picric acid in methylated spirit.

The work of Sabouraud seems to us to confirm this method. He found that the soft and carefully washed skin forms a bed in which micro-organisms live and multiply, whereas the dirt-hardened skin of the labourer is comparatively sterile. We avoid injuring the epithelium by hard scrubbing, and endeavour to harden it by spirit and picric acid. Spread a wet sheet of boiled Billroth tissue, with an oval hole or slit cut in it, over the abdomen. Secure the bottom of this opening to the skin just above the pubes either by a silkworm-gut suture or by catch forceps. In like manner secure the upper end to the skin about four inches above the umbilicus. Over this place a sterilized sheet, boiled, and then dried in the oven, with a slightly larger central opening, and let this sheet overhang the edge of the table on either side. This sheet is useful for instruments, sponges can be temporarily laid upon it, and if it is touched the hands are not contaminated.

The operation

Opening the peritoneal cavity. Make a median incision from three inches above to four inches below the umbilicus, curving around the latter. Sever the skin and fat with this cut. Expose the glistening muscular aponeurosis of the recti in the whole extent of the wound. Cut through the aponeurosis and separate the muscles with the handle of the knife. Catch up the fascia below the muscular layer in two places half an inch apart. Pinch this piece of uplifted fascia to make sure that no intestine has been seized. Cut between the forceps cautiously with the knife. Pull up the

peritoneum near the umbilicus and open it, if it were not included in the previous incision. There is no risk of injuring the bladder if the peritoneum is first opened near the umbilicus.

When the peritoneal cavity is opened the large pregnant uterus appears. Insert a finger into the peritoneal cavity, and using it as an intelligent guide open the cavity for the whole extent of the wound. Be cautious when approaching the bladder, which can be felt and seen. If the intestines fall over the uterus, push them up towards the diaphragm and keep them back by a long roll of plain sterile gauze wrung out in sterile salt solution.

Cutting into the uterus. Examine the uterus to see that it is lying straight as regards the skin incision. If it is not, make it so, and get one assistant to press back the skin wound and so squeeze the uterus up. If the uterus is not straight, the slanting cut exposes a larger bleeding surface. There is no need to pack round the uterus with gauze, to shut off the liquor amnii from the peritoneal cavity, unless there is reason to think the uterus may be septic. Make a cut about one inch in extent into the lowest and least vascular portion of the uterus down to the membranes. Insert a finger into this wound and move it up towards the fundus, separating the membranes. Extend the wound rapidly upwards for about 5 inches. Speed is essential to this part of the operation, speed and a cool head. Blood flows freely. If the placenta is not lying in front, the membranes are reached without the occurrence of unnerving haemorrhage. On the other hand, if the cut goes through the placenta, there may be severe bleeding. Cut deliberately. Do not slash the uterus open, for you may cut the child, although it has rarely been seriously injured in this way.

It has been suggested that the placental site is indicated by greater vascularity of the uterine wall. To avoid wounding the placenta, incisions on the fundus or even the back wall have been recommended. We do not attach much importance to this, and do not endeavour to avoid wounding the placenta.

Extraction of the child, placenta, and membranes. Whilst the liquor amnii is escaping, plunge your hand into the uterine cavity, catch a leg and extract the child. The assistant should hook a finger into the upper extremity of the wound and keep it open. Sometimes, if the incision is too small, the rapidly contracting edges of the wound catch round the child's neck. If this occurs, extend the wound with the knife. This will rarely be necessary if the child is removed rapidly. Hold the child up by the legs, nip the cord with catch forceps, sever it below the forceps, and hand the child to the assistant or the nurse, but avoid touching them. Remove the placenta manually. If the membranes do not follow, wipe them out with a swab of gauze.

Special duties of the assistants. The two assistants have important parts to perform at this stage. When the child is being extracted the uterus will be pulled out of the abdomen, and the assistant's finger in the uterus keeps it there. As soon as the child is extracted, the assistant clips the skin wound together, with forceps underneath the protruded uterus to prevent it falling back. He then puts a boiled towel wrung out in hot water round and under the uterus to form a warm bed for it and to make it contract. The other assistant passes his hands through the abdominal wound down into the pelvis on either side of the uterus, catches both broad ligaments and cervix and bunches them up. He grips the lower part of the uterus in tightly and so controls the haemorrhage.

Sewing up the uterus. Before sewing up the uterus, if operating before labour has begun, push a finger through the cervix to allow of vaginal drainage.

As long as the assistant keeps a tight grip of the broad ligaments and cervix, there will be no haemorrhage. Sew up deliberately. Use a curved needle with No. 3 silk, and sew up with interrupted sutures about half an inch apart. Do not tie them until all are in position. They should pass through the uterine wall deeply, but not through the decidual membrane. In tying, bring the edges into firm apposition, but do not pucker the tissues for fear of strangulation. Cut them short, and, if any gap is left, insert others.

Some advise that these sutures should be buried by sewing peritoneum over them, but we do not think this necessary.

Fine silk is absorbed, for having had occasion to perform Caesarean section a second time on the same patient within twelve months we could find no sign of sutures, scar, or adhesions of the uterus to the abdominal wall, showing both that silk absorbs, and that severed muscle may unite admirably.

The question of sterilization. The question of sterilization will have been considered before the operation was undertaken. To sterilize the patient pass two ligatures of No. 3 silk round each tube about an inch apart and cut away the tube between these ligatures.

There is no need to sterilize the patient for fear that a further pregnancy may cause rupture of the uterus, for when the operation is properly performed this will not occur.

Closing the peritoneum and wound. One assistant unclips the skin under the uterus and lets the uterus fall back into the abdomen. The other assistant removes his hands from the abdominal cavity. Count the sponges to see that none are missing.

Sew up the abdominal wall in three layers, the peritoneum and aponeurosis with continuous fine silk sutures. These remain buried. Bring the skin together by any ordinary means. We choose the subcuticular method. Pass a long piece of silkworm gut on a straight needle in a zigzag manner first into the skin on one side and then on the other, beneath and not including the surface epithelium. Pass each free end at either end of the incisions through a hole in a long leaden plate and tie them together over the leaden plate. If the ends will not reach, tie another piece of gut to one of them and then tie. When we do not use the subcuticular suture we approximate the skin edges with Michel's clamps. Lay a few aseptic pads over the plate and keep all on with a firm binder. Put the patient back to bed.

After-treatment. A catheter is passed every eight hours. At the end of twenty-four hours we give calomel gr. j every

hour up to gr. vj. Then we give a saline purge, usually one or two tablespoonfuls of effervescing magnesia. If the bowels are not opened within thirty-six hours a soap and water enema is given. The patient has water to drink, one ounce at a time, if not sick. When the bowels have opened, food is given. The baby is put to the breast as after ordinary delivery.

The dressings are not touched until the eighth day. The silkworm suture is then cut and pulled through, a procedure which causes little or no pain. Another sterile pad is put on the wound and remains there until the necessity for it ceases to exist.

The patient is kept in bed for two to three weeks.

HYSTEROTOMY OR EXTRAPERITONEAL CAESAREAN SECTION

This operation has lately been introduced. Its advantages are, that the intestines are shut off by the peritoneum from the field of operation; that the amount of blood lost is very slight; that there is less fear of sepsis; that the scar is not in a dangerous situation if subsequent pregnancy occurs; that it can be performed safely after the membranes have ruptured and labour is well advanced; in fact, it is of advantage to defer the operation until there is a well-formed lower uterine segment. Perhaps its greatest advantage lies in the fact that the intestines cannot adhere to the scar.

The operation. After the usual preparations a transverse incision is made from one anterior superior spine to the other, passing about one inch above the pubes. This incision is carried down to and through the sheath of the rectus. The sheath is raised from the muscles and the latter separated with the handle of the knife.

The transversalis fascia is then broken through, laying bare the peritoneum.

The peritoneum can sometimes be separated from the back of the pubes and from the bladder. The lower uterine segment is thus reached without opening the general peritoneal cavity. We do not think this is an advantage,

and much prefer to open the parietal peritoneum transversely, opening the abdominal cavity and exposing the bladder and lower uterine segment covered by peritoneum.

The bladder is raised, putting on the stretch the vesico-uterine fold of peritoneum. A small incision into this fold at the side permits the passage of a finger between the uterus and bladder. On this finger the peritoneum is divided across the whole width of the vesico-uterine fold. The upper edge of the incised peritoneum is seized and separated upwards from the uterus. This edge is then stitched to the upper margin of the transverse incision in the parietal peritoneum, to shut off the general peritoneal cavity from the field of operation and to enclose the intestines in a bag of peritoneum. Interrupted sutures should be used, as a continuous suture causes puckering and contraction of the opening. The sutures should be inserted well out towards the lateral aspect of the opening to close the angles. Unless this is done communication is not shut off and fluids may enter the abdominal cavity, or the intestines may appear at the angle of the wound. It is not necessary to stitch together the two layers of the peritoneum above the bladder.

Sufficient room to permit easy delivery is readily obtained by this method of exposing the lower uterine segment.

It is comparatively easy to reach the lower uterine segment without opening the peritoneum, making the operation entirely extraperitoneal.

The bladder is filled with water and pushed to one side. The peritoneum can then be separated from the abdominal wall and anterior layer of the broad ligament, laying bare the lateral aspect of the lower uterine segment.

Such a procedure is not to be recommended, as the theoretical gain in an entirely extraperitoneal operation is counteracted by the greater exposure of cellular tissue, by the small space at the operator's disposal, and by the more vascular region through which he has to work.

The lower uterine segment and cervix, however reached, are opened vertically. The head, if presenting, is delivered with the lower blade of the forceps and the other hand. If

the breech presents the child is extracted by the leg. The cord is clamped and cut.

Time is given to allow partial separation of the placenta. During this pause a hypodermic of ergotinin gr. $\frac{1}{50}$ may be administered, as post-partum haemorrhage may occur. It was a complication in three of our cases. The placenta and membranes are removed, and the uterus plugged with iodoform gauze, the end of which is pushed through the cervix into the vagina.

The uterine incision is closed by interrupted catgut sutures. The free edge of the peritoneum immediately above the bladder is united with catgut sutures to the upper portion of peritoneum from which it was originally separated. The corresponding edge of the parietal peritoneum may also be brought up in this manner.

The sheath of the rectus is closed with a continuous suture of No. 3 silk.

The skin-wound may be closed with Michel's clamps or any form of suture.

The lower uterine segment is said to heal so perfectly that no danger of rupture of the uterus is incurred by a subsequent pregnancy.

The operation is not suitable for cases in which the cavity of the uterus is known to be septic. In doubtful cases, where a possibility of septic infection arises, greater safety can be obtained by forming a utero-abdominal fistula.

I have performed this operation three times up to November 1910 with perfect success.

SYMPHYSIOTOMY

Indications. The indications have already been discussed under Contracted Pelvis. The operation adds about half an inch to the conjugate diameter of the brim. The transverse diameter is also widened. Walcher's position, when the head is passing the brim, adds another half-inch to the conjugate.

Preparation. Preparations are much the same as for Caesarean section, if there is time. If the operation has to be done hurriedly, the pubes is shaved, washed with soap and water, ether, and biniodide of mercury. The vulva, vagina, and hands are cleansed as for any obstetric operation.

Instruments. The minimum needed will be—

1. A scalpel.
2. Six Kocher's or Spencer-Wells's forceps.
3. Gauze wipes.
4. Needle-holder, curved needles, and sutures of silk-worm gut.
5. Scissors.
6. Director.
7. No. 3 silk.

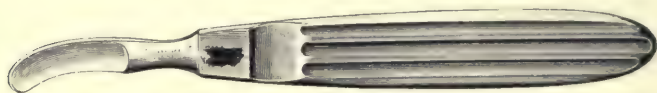


FIG. 192. Pinard's symphysiotomy knife.

Time of election. The best time is when the os is sufficiently dilated or dilatable to permit of rapid delivery. It may, however, be undertaken at any time during the second stage. Be sure the child is alive.

Assistants. One assistant to give the anaesthetic and one or a nurse to help are needed.

Position of the patient, operator, and assistant. The patient is put in the cross-bed position, but the bed must be firm and not permitted to sag in the middle. Sit between the patient's legs, which hang down, with the assistant on the bed either to the right or left of the patient. Two assistants, one at either side, are an advantage.

The operation. Make an incision through the central skin of about an inch, starting half an inch above and continuing it down to the symphysis. Deepen the incision over the pubes until the knife grates on the bone. Insert a finger into the wound and pass it over and down behind the pubes. Separate the bladder well by sweeping the finger from side to side between the bladder and the pubes. Pass the finger further down and hook it under the pubic arch. The bone is now cleared.

The two helpers keep the hips pressed together, for when the symphysis is cut through the bones may gape suddenly from the descent of the head, resulting in injury to the bladder and severe haemorrhage from torn soft parts.

Put one finger of the left hand again into the wound and keep back the bladder. Cut through the cartilage of the joint with the knife slowly from above downwards and from behind forward without severing the stout subpubic ligament. If preserved, this ligament, though stretched, forms a natural splint and facilitates successful recovery. The knife readily passes through the cartilage. Sometimes it is necessary to cut the subpubic ligament to allow sufficient room for the head to pass. Stop any haemorrhage by tying the bleeding vessel with silk or by the pressure of iodoform gauze.



FIG. 133. Diagrams of the lines of separation of the bones in symphysiotomy and pubiotomy.

The child is delivered either by the natural pains, or forceps, or version. Remember Walcher's position, and do not deliver when the patient is deeply anaesthetized.

Close the wound with interrupted silkworm-gut sutures. Neither the bone nor the deep parts of the wound need be brought together by sutures. Dress with aseptic pads or gauze and wool and keep on the dressing by a T bandage. Apply the binder and pull the separated bones together by a stout canvas belt with straps and buckles. These need not be pulled excessively tight. Care should

be taken not to nip the bladder between the bones. An ordinary navvy's belt from a harness-maker does very well. A binder is not strong enough for this purpose, but will do temporarily.

After-treatment. The patient can be gently turned on her back in twelve hours, and turns herself after twenty-four hours.

Pass a catheter every eight hours. Open the bowels, and give water and food and put the baby to the breast as after Caesarean section. Dressings and stitches are left until the sixth day, provided the wound is clean. Watch carefully for cystitis; this is a possible sequel if the bladder has been injured. Sepsis and injury to the urethra and vagina are also complications.

It was formerly thought that convalescence from symphysiotomy was bound to be tedious and painful, but when aseptically performed this is not the case. Our last patient walked on the sixteenth day. In changing dressings, pads, sheets, &c., the patient can be lifted bodily by the belt or underlying binder without causing any discomfort, and she is always lifted in this manner when the draw-sheet is renewed. When the binder is to be changed it is slipped into the hollow of the back, the patient is raised by the belt, and a new binder laid under her. The belt is then slipped up and taken out, the patient raised by the binder, and the belt replaced outside the binder as before.

PUBIOTOMY

Comparison of pubiotomy and symphysiotomy. The indications for these two operations are the same, the added half-inch that they give to the conjugate of the brim is the same, and therefore it becomes essential to decide which of the two is the better operation. Symphysiotomy is the older operation, nevertheless we think pubiotomy will be the operation of choice for the following reasons:—

1. It is easier to perform.
2. The bladder and urethra are less likely to be injured.
3. The bone unites as in a simple fracture.

4. There is sometimes a lasting increase in the size of the pelvic brim as demonstrated in two of our cases.

Disadvantage of pubiotomy. The special instruments required may not be obtainable. Those for symphysiotomy always are.

Preparations, assistants, and instruments. Although in the main these are similar to those required for symphysiotomy, yet there are some special points.

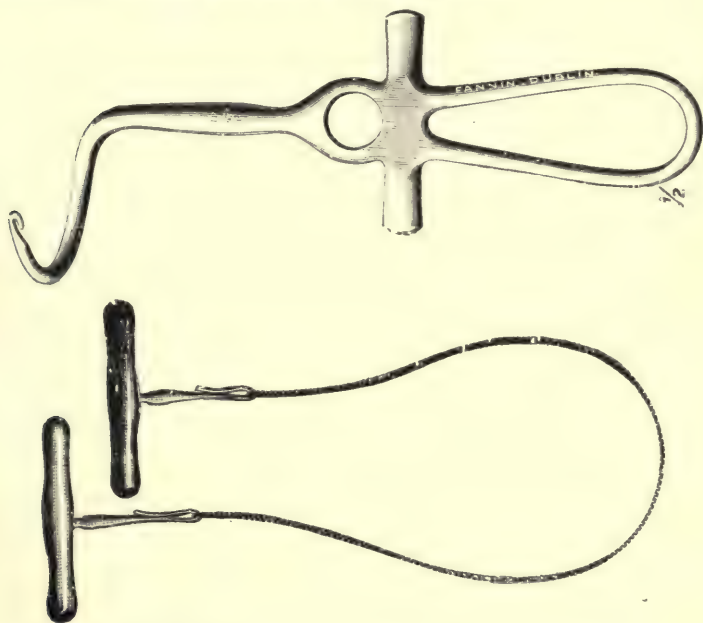


FIG. 134. Döderlein's pubiotomy needle. Gigli's saw.

A Gigli's wire saw and a Döderlein's needle will be wanted. It is as well to have at least two saws, for they may break.

Time of election. The best time is when the os is nearly fully dilated. If the membranes have ruptured, it is a pity but not a contra-indication. The child must be alive.

Plugging the vagina. First plug the vagina in the manner described on pp. 129-30. This plug will promote labour pains, dilate the os, and, by stretching the vagina, allow of rapid delivery. Whilst the plug is in the vagina,

make preparations for the operation. The patient can be kept just unconscious with chloroform, if it had to be given for the plugging.

Operation. The positions of the operator and patient and the duties of the assistants are precisely similar to those described under symphysiotomy. The patient is in the cross-bed position, the operator sits between her legs and an assistant on either side, one of whom has washed hands to help; the other gives chloroform, and, at the time of the severance of the bones, presses against one thigh. Remove the plug and carefully douche the vagina and pass a catheter. Let the patient's legs hang down.

Make a vertical cut half an inch or a finger's breadth to one side of and above the symphysis pubis, sufficiently long to get one finger into the wound. Deepen the cut until the knife grates on the bone. It severs the ligaments that pass from Poupert's to the suprapubic ligament. Insert one finger and separate the bladder.

Pass Döderlein's needle through this wound, over and then behind the pubes, and down towards the same side of the anterior vaginal wall. Make the point of the needle hug the posterior surface of the pubes closely, even to the extent of insinuating it between the periosteum and the bone, were this possible. Put a finger into the vagina and feel that the point is hugging the posterior surface of the bone.

The point of the needle emerges beneath the arch about $\frac{1}{2}$ to $\frac{3}{4}$ inch from the centre, bulging the soft parts in front of it. Pull these well inwards over the point and expose it with a nick of the knife. The object of pulling the parts inwards is to ensure that the point of the needle emerges through the skin outside the labium, thereby preventing haemorrhage from the cavernous tissues.

Attach the Gigli's wire saw to the special hook on the end of Döderlein's needle. Withdraw the needle, which pulls one end of the saw out of the upper wound.

The saw is now in place passing behind the pubes. Get your assistants to press the thighs together, and get one to press a gloved finger on the anterior surface of the pubic

Year 1907-
Month June

ROTUNDA LYING-IN HOSPITAL. BED No. _____

Name *Stephen Jones* Age 36

Admitted June 2nd at 1 1/2 A.M. P.M. No. of Pregnancy 4th Period of Pregnancy 4th months

Previous Labours *Normal* Abortions _____ Full Term /

Date of Last Labour December 6th 1905. Embrure 2

Last Menstruation commenced August 26th 1906. On Admission Good

State of health during Pregnancy Good

Fetus, Measurements F.C. 20 In Cm. 27 In Sp. 28 In Cm. 7 Traas 11.5 Grb.

Abdominal Palpation _____

Vaginal Examination _____

1. *Second cervix not taken up, no ascending part felt* 2. *XV* 3. *A. N. Reflexes*

3. *Contracted Relaxed*

Labour commenced 5th of June at 4 a.m. pin. Membranes ruptured 7.25 a.m. pin.

Infant born 10.55.0 m June 5th Placenta delivered at 30 minutes.

Presentation *Vertex* Position 2nd Nature of Labour *Substernum*.

Membranes *Complete* Placenta *Complete*.

Examined before admission Perineum *Intact*.

Student *V. H. Webster* Nurse in charge *White*.

Date of last having bed June 21st

Date of discharge June 23rd 1907 Condition when leaving Hospital *Convalescent*

Day Nurse in charge *Y. Ranger* Night Nurse in charge *Pyrra*.

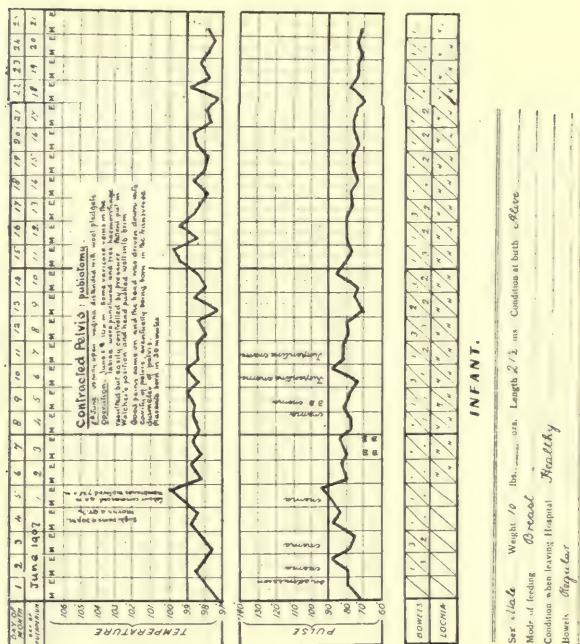


FIG. 135. Chart of a case of delivery by pubiotomy.

bone at the spot where it is to be severed, so that he may know when the bone is severed. Attach the two handles to the ends of the saw and saw up and down, keeping the saw as straight as possible, for there is then less laceration of soft parts and less likelihood of breaking the saw. Proceed cautiously when the bone is nearly severed, and be ready to detect complete severance by the change of sensation, should the assistant fail to detect it at once. You can tell before the saw is withdrawn by pressing the skin between the separated bones with the top of your finger. The bones, apparently, do not spring apart, unless the head is being forced down by the contracting uterus. The chief complications are laceration of the soft parts, haemorrhage, haematoma, and non-union of the bones. To forestall laceration some operators make a preliminary vulvo-perineal incision.

When the bones are severed let the woman deliver herself, getting her, while still unconscious with chloroform, into Walcher's position, whilst the head passes the brim. If she fails to deliver herself in an hour, if she is at all collapsed, or if the foetal heart indicates distress, deliver her artificially, unless there is complete uterine inertia. With artificial delivery bad tears which bleed may occur. They should be stitched. Sew up the wounds with silk-worm gut and dress them with iodoform gauze and wool kept on by strips of plaster.

After-treatment. The subsequent treatment is similar to that after Caesarean section. Put on a binder and a navvy's belt or strips of plaster round the pelvis. The patient may be moved on her side within twelve hours, and may move herself after three days. Remove the dressing and stitches on the eighth day and let her sit up in bed on the fourteenth day, sit in a chair on the fifteenth day, stand and take a few steps on the sixteenth day, and walk freely from the seventeenth day. Our patients have had no difficulty in walking after getting up.

If, when the catheter is passed, blood comes with the urine, the bladder has been injured. Such an injury readily heals.

Prognosis. We have performed six pubiotomies with one foetal and no maternal deaths.

Subcutaneous pubiotomy. The operation as above described is practically that performed by Döderlein. Recently Bumm's subcutaneous pubiotomy has met with great favour. The preparations are the same. A sharp needle specially designed for the purpose by Bumm is passed from below upwards, without any preliminary incision, through the soft parts and behind the pubes, following the course described in Döderlein's operation. The needle is kept pressed

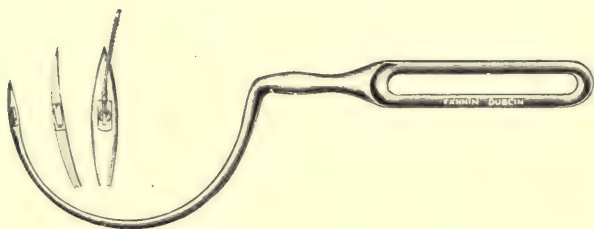


FIG. 136. Bumm's subcutaneous pubiotomy needle.

against the bone by a finger in the vagina. A Gigli's saw is attached to a hook in the eye of the needle and pulled from above downwards behind the pubes, which is now severed as in the open operation. The soft parts move with the saw and are not lacerated. The advantages of this operation are its simplicity and the ease with which haemorrhage is arrested by pressure above, in front of, and below the severed bone. Subsequent treatment is the same as in the other operation. Our last (five) pubiotomies were performed subcutaneously with a perfect result.

PERFORATION

Reason of its past frequency. Perforation is an operation that is far less frequently performed now than in the past. In the past the perforator was used too much, the reason being that in private practice the pelvis was not measured and the abdomen was not palpated. Forceps were often applied before the indications for them were fulfilled,

that is, the fixing of the head by its largest diameter in the brim and the full dilatation of the os. The application of forceps to the head above the brim was known as the operation of high forceps. A doctor watched his patient in labour for some twenty-four hours and then decided to deliver her, although no proper indication for forceps was present. The temperature and pulse of the mother were not noted at all. He then put on the 'high' forceps, and sometimes succeeded in delivering the child. When there was some degree of contracted pelvis as often as not he failed, and he then proceeded to perforation. Had he waited until the head moulded, this disastrous result would seldom have occurred. We know, for example, of a doctor who, having tried to pull a child through with high forceps, rode twenty miles to fetch his perforator. On his return he found the child born by the natural efforts of the mother.

We never recommend 'high' forceps. As a matter of fact, we have occasionally put forceps through an os that was fully open, with membranes ruptured, &c., on a head that was not properly fixed in the brim and pulled tentatively. Sometimes the unexpected happens and the head progresses. But if this does not happen we quickly abandon the attempt. We recommend pelvimetry with Skutsch's pelvimeter and Müller's method of pushing the head into the brim, so that the case may be treated on the principles laid down under contracted pelvis.

When to perforate. If the child is dead and delivery is indicated, perforate if the conjugate of the brim is not under two and a quarter inches. When the conjugate of the brim is under two and a quarter inches a perforated child may be pulled through with the help of cleidotomy; but the maternal mortality of such an operation is very high, and Caesarean section, intra- or extraperitoneal, is safer.

Should a living child ever be perforated? In our hospital a living child has not been perforated for a great number of years, nor have we ever had to sacrifice a child in this way in private practice. We prefer Caesarean section or pubiotomy. When maternal symptoms become urgent, the child is nearly always dead.

Instruments. We think Winter's combined cranioclast and cephalotribe is the instrument of choice, but we describe the operations with the separate instruments. A douche, a large Bozemann's catheter, a vaginal nozzle, perhaps a crotchet, bullet forceps, a catheter, a Simpson's perforator, and a lion forceps may all be needed.

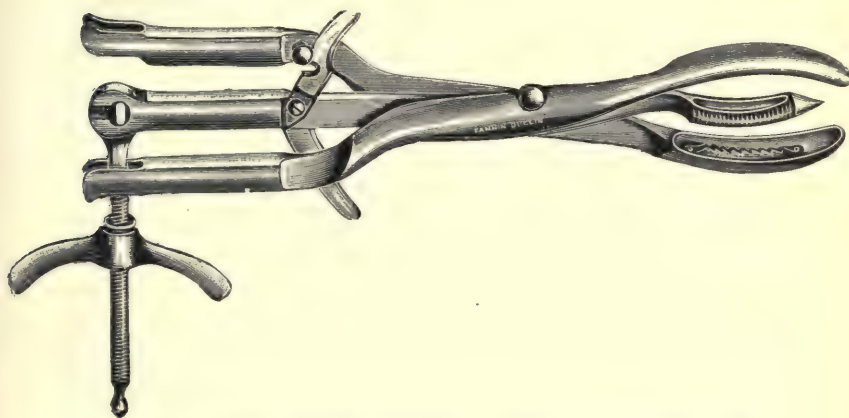


FIG. 137. Winter's combined perforator, cephalotribe, and cranioclast.

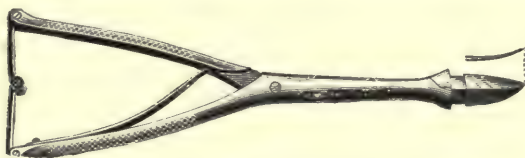


FIG. 138. Simpson's perforator.

Preparation. The patient is anaesthetized and put in the cross-bed position. It is essential in this operation to be absolutely surgically clean. The patient is exhausted, and it has been definitely proved by bacteriologists that exhaustion greatly lowers a patient's resistance to infection. The broken bones have sharp points and tear the soft parts. The perforator may slip and injure the soft parts. Often the os is not fully opened and so the cervix is lacerated. It is a rough and somewhat brutal operation, in which parts are most likely to get lacerated and offer channels for infection in a woman now less able to resist it. After

shaving wash the skin of the vulva, pubes, and groin most thoroughly with soap and water. Wash off this soap and water and put over the parts a pad of lint wrung out in biniodide of mercury, while you again cleanse your hands and put on boiled rubber gloves.

Then wash the muco-cutaneous surface of the labia minora with soap on pledgets of wool, held on tongue forceps. Douche the vagina thoroughly. Empty the bladder with a catheter.

The perforator. To perforate successfully, once more remember the golden rule of putting your whole or half hand into the vagina. Make sure that the head is presenting by feeling a suture or fontanelle. Get the nurse or an assistant to press the head down towards the pelvic cavity, thus causing artificial fixation of the head whilst perforating, for if the head shifts after perforation you may not easily find the hole again. Pass the perforator up to its shoulder, through a fontanelle, suture, or bone, whichever is easiest. Bore a little with the point to get it through the bone, surrounding the instrument with your fingers to prevent slipping. Having pierced the skull and buried the perforator up to the shoulder, open the instrument. Close it again, turn it round a quarter of a circle, and open it again. The fingers, as we have said, show whether a sufficient hole has been made. One more step we advise, namely, to push the perforator up to the medulla of the child. We think that we shall never have to perforate a living child, but it is possible one might decide a baby was dead when it was really alive. When the child is born and the medulla is not destroyed, the child cries, and this must be a horrible experience, which can be prevented by pushing the perforator on to the medulla and turning the point of the instrument round in the soft medullary nerve matter.

Washing out the brain. The next step is to withdraw the perforator and douche out the brain matter. Pass a large Bozemann's catheter through the hole in the skull and break up and douche out the brain. Remove any loose bone with forceps.

Extraction with the cranioclast. It is not difficult to fit

the cranioclast. Take the inner blade, and, guiding it with fingers in the vagina, push it through the hole in the skull as far up as it will go. Take the other blade and push it up outside the skull, where there is room. If the blades do not lock, tell the nurse to refrain from pressing the head down. Keeping the outer blade in its place, turn the inner blade so that they will lock. The head will probably spin round with the inner blade. Screw the blades together and pull. Feel with your fingers for any sharp spicules of bone and prevent them lacerating the vagina. If the head will not come through, spin it round in another position and pull again, but do not twist and pull at the same time. Pull it in the position in which it descends most readily. Remember, too, that further advance after some descent may be prevented by the shoulders. If this is so, pass up stout scissors, and, directing their action with your fingers, cut through the clavicles.

When the pelvis is very small the head cannot be extracted without breaking it up more completely. Catch the base of the skull between the blades of the cephalotribe, crush it and extract the foetus.

Extraction with the cephalotribe. Put the blades on as forceps, making the top of the blades reach up to the child's neck. Get them one on either side of the widest diameter of the head, else they will slip. Lock the blades as forceps are locked. Screw up tightly until the base of the skull is fractured and pull the child out, pulling in the axis of the pelvic cavity.

Extraction with Winter's combined cranioclast and cephalotribe. This is the most effectual instrument. First put on the cranioclast, and usually that will suffice. If it does not, fit the cephalotribe blade and crush the base of the skull. This is easier than with the cephalotribe only, for the cranioclast keeps the head steady and prevents it from slipping whilst the cephalotribe blade is fitted. Study the instrument before using it, so as not to get confused by the fitting of the three blades.

Perforating the aftercoming head. When possible per-

forate through the mouth. This diminishes the anterior part of the brain and results in increased flexion. The perforator is much less liable to slip when placed well within the mouth and the sharp spicules of bone left after all perforations cannot injure the soft parts.

Perforating the separated head. Sometimes in extraction of difficult breech and in decapitation the separated head is left in the uterus. As a rule it is easy to extract by getting an assistant to press it into the pelvic brim, putting forceps on to the head and extracting. The brain matter escapes during extraction and makes the head small. If this fails, keep the head still by fixing it with the crotchet or hook which passes into the child's eye or mouth, or use bullet forceps. Then adjust the cephalotribe. If you use the cranioclast get the vertex fixed over the os and perforate.

Douching the uterus. After perforation the uterus and vagina must be thoroughly douched.

EVISCERATION

Sometimes delivery of a dead child is delayed by an abnormally large chest or abdomen. If the chest is the cause of delay and cutting through the clavicles with stout scissors fails to effect delivery, get the nurse to pull or push the child down as far as possible, so as to get the chest within reach, then, directing the scissors with a hand in the vagina, open the chest. Remove the viscera manually. If the child's swollen abdomen is the cause of delay, clear out the abdominal viscera in the same way. Douche the uterus thoroughly after evisceration. Have the patient under chloroform both to save her pain and the repulsive sight of a mangled child.

COMPLETE PERINEAL TEAR

When the tear extends through the mucous membrane of the rectum, sew it up carefully, and at once, to avoid incontinence of faeces.

Give the patient chloroform, if she is not already under its influence. Put her in the cross-bed position with her

buttocks well over the edge of the bed. Douche the parts clear of blood.

Uniting the rectal mucous membrane. This is done by interrupted catgut sutures, which are passed and tied so that the knots are left in the lumen of the bowel.



FIG. 139. Suturing a complete tear of the perineum.

Pass the first at the upper angle of the tear in the mucous membrane. Take a fine fully curved needle, armed with catgut. Pass it first from the rectal lumen through the edge of the mucous membrane at the upper angle of the tear, then through the opposing edge from without into the lumen of the bowel. The suture thus starts from, and ends within, the lumen of the bowel. Consequently when the knot is tied it is in the bowel. Tie this suture and then continue with the next, or put in as many as are necessary to

restore the mucous membrane tube one after the other, and then tie first the highest, then the next, and so on. The catgut sutures are absorbed within the week.

The sphincter ani. The ends of the sphincter are now brought in front of the rectum by two silkworm-gut sutures, the knots to be fastened on the perineum anterior to the anus. The perineum is united with silkworm gut as in simple perineal tear.

After-treatment. We give the patient tincture of opium m x t.d.s. , and give her no food, but albumen water until the eighth or ninth day. The bowels are then opened by small doses of *Mist. Sennae Co.*, and a soap enema of one pint or olive oil half a pint. The faecal mass formed by albumen water is very small, that from milk bulky. Take the silkworm-gut stitches out on the eighth day.

If there is failure to unite or a fistula. Healthy granulating surfaces can be brought together at any time and readily unite. This should be taken advantage of if the first repair is unsuccessful. If the repair of the granulating wound does not succeed and a secondary operation is found necessary it should be deferred for six weeks at least.

PART IV

THE ABNORMAL PUERPERIUM

CHAPTER XV

GENERAL PRINCIPLES OF PUERPERAL INFECTION

Puerperal infection. With the exception of nervous and intestinal influence, we hold that whenever the temperature of a puerperal woman rises above 99° F., except during the first twenty-four hours of the puerperium, she is in some way infected either by micro-organisms, or by the products of retained lochia.

We will, therefore, first dispose of nervous temperatures, and then we shall be free to deal with the important subject of puerperal infection.

Nervous temperatures. In rare cases, when no other cause can be found, we are compelled to attribute the rise of temperature to nervous influences. For example, a patient in hospital was visited by her husband on the fourth day at 3 p.m. He spoke sharply to her, and she was perturbed. At 5 p.m. her temperature, which had been normal, was 103° F., but her pulse was under 100. Nothing was done, and by 10 p.m. her temperature was again normal. Again, in hospital we notice that slight rises of temperature are more common on visiting than on other days.

The causes of puerperal infection and their importance. It is now generally acknowledged that the causes of puerperal infection are bacteria, which gain entry to the parturient canal. The commonest way in which they gain entry is from non-sterile fingers or instruments, or they are carried up by sterile fingers or instruments from labia minora that have not been efficiently cleansed. In other

words, puerperal infection (certainly all infection of a serious nature) is to be attributed to failure on the part of the nurse or medical attendant to preserve strict cleanliness. For example, whenever we get a bad case of sepsis or a series of minor cases in hospital, a careful investigation is made as to how the patient was attended at birth, whether washing was sufficient, whether the nurse had any other cases of infection, any sore on her hands, &c., and the patient is cleansed with swabs held on forceps by the nurse, lest she

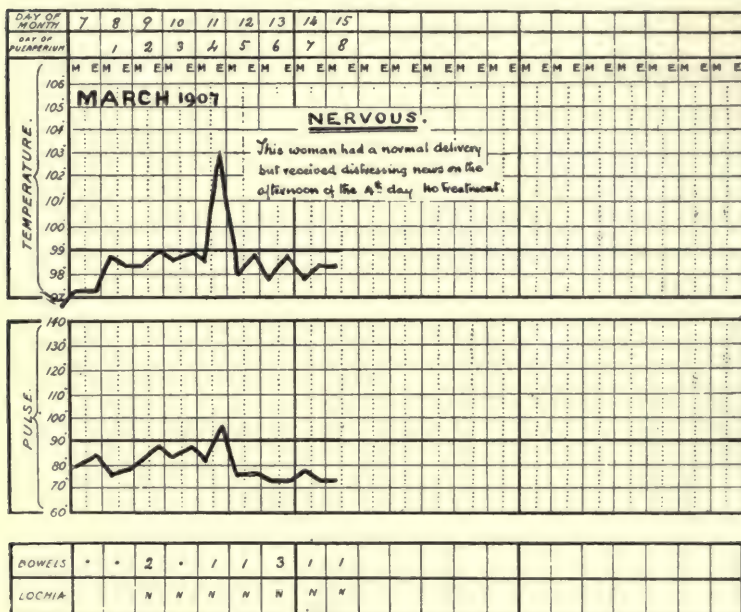


Fig. 140. Temperature due to nervous influence.

should carry the infection to other cases, under her charge. So, too, every patient has separate numbered utensils, towels, mug, basins, &c. The bedding of a patient who has had sepsis is sterilized by steam before it is again used. Gloves, too, are always worn by us in attending in any way to any puerperal patient's genitalia. We only give these as examples of the care that is needed in hospital to prevent sepsis in any form arising, and we maintain that, were

a like care exhibited in private cases by practitioners, puerperal sepsis would not still be the scourge it is shown to be by the Registrar-General's returns. Nor can the mortality of puerperal infection be regarded as a true guide to the extent of its ravages. It is doubtful whether a woman ever completely recovers from an attack of puerperal sepsis. Definite defects, such as twisted tubes, chronic metritis, endometritis, adhesions, retroversion, chronic pyosalpinx, or more obscure ailments such as frequent or constant pains, are found, and the mother says she has never been quite strong since the birth of the baby. We emphatically insist, as we have already done in this work, that the seriousness of sepsis is in no way measured by its mortality, and is far better measured by its morbidity.

Organisms of puerperal infection. The common bacteria of puerperal infection are streptococci, staphylococci, bacillus coli, and gonococci. Saprophytes, too, take part in sapraemia. The prevalence of these organisms need not be urged. All of them are constantly attacking the health of human beings, and in human habitations streptococci, staphylococci, and bacillus coli are always to be found. Infection by bacillus coli is obviously a constant danger, considering the nearness of the anus to the perineum and vulva.

These organisms often act in concert. Thus a shaggy endometritis, due to bacillus coli associated with streptococci, is a condition of extreme danger. Gonococci alone are seldom dangerous, but when associated with other organisms their virulence is greatly increased.

The frequency of infection by pneumococci has been underestimated. It has been demonstrated in several of our cases, one of which ended fatally. In this case it is almost certain that the infection could not have been introduced *per vaginam*. In another case it was found in a septic uterus after spontaneous delivery, no vaginal examinations being made. The patient had a diffuse bronchitis for several days before delivery.

Other bacteria cause puerperal sepsis, but those we have mentioned are by far the most frequent.

Pabulum of the bacteria. Micro-organisms live readily in

lochia; they live readily on dead material, such as retained bits of placenta, membrane, or blood clot. They live, too, on raw surfaces. The intact mucous membrane of a normal vagina and cervix forms an insuperable barrier to the passage of bacteria in sufficient force to cause infection. After labour the mucous membrane is bruised and lacerated, and is no longer the barrier that it normally is.

General principles of puerperal infection with especial regard to treatment. Micro-organisms cause puerperal infection, and the reason why a patient recovers is that she is able, either with, without, or in spite of her attendant's treatment, to overcome and destroy the infecting agent. Bacteria poison the body by their toxins; the body depends on the presence and manufacture of protective substances to kill the bacteria and neutralize the poisons.

The researches of Lord Lister and his successors have taught us how we may best prevent infection. But in this chapter we are dealing with cases in which for some reason the prevention has failed and the body has now to overcome the infection. Clearly, as nearly all cases end in eventual recovery, the body is able to overcome the infection. Two questions of practical importance arise: How does the body overcome the bacteria and their toxins? and, In what way can we aid its efforts?

The most recent work of bacteriologists shows that the body opposes the attack of micro-organisms mainly in three different ways:—

1. By means of substances in the serum of the blood that kill the bacteria directly—the bactericidal substances.

2. By the presence in the serum of the blood of substances which have been named opsonins by Sir A. E. Wright. These substances combine with the bacteria and alter them, so that the phagocytes can destroy them.

3. By the elaboration in the blood serum of antitoxins, substances that combine with and neutralize the toxins.

Of the common organisms of puerperal infection, streptococci, staphylococci, and gonococci are not much affected by bactericidal substances, but are readily opsonized and ingested by phagocytes. *Bacillus coli* is killed by bacteri-

cidal substances and opsonized. The toxins of all are neutralized in the body by antitoxic substances.

It may also be stated, as a law of the body's reaction, that when a patient is overcoming infection, the protective substances in the blood are in excess of the normal amount. In other words, when bacteria attack the body, it, unless entirely overwhelmed by the violence of the attack, responds by manufacturing a large amount of specific antibacterial substances with which to combat and destroy them. Sir A. E. Wright has shown that if a dose of dead bacteria is injected into the body, at first the power of resistance falls below, and then, with reaction, rises above, the normal. He has named the fall the negative phase and the rise the positive phase. Clinically the negative phase corresponds with the feeling of illness and the rise of temperature and pulse-rate that result from infection, and the positive phase with the feeling of betterment and fall of temperature and pulse that result from the body's successful reaction.

The practical questions of treatment are—

1. Can we help the bactericidal action?
2. Can we help the opsonic and phagocytic actions?
3. Can we help the antitoxic action?
4. Can we help the supply of the body's antibacterial substances to the affected part?
5. Can we prevent further attacks?

Can we help the bactericidal action? The answer to this must be tentative. Laboratory experiments give hope that by the injection of vaccines, composed of a stated number of dead bacteria, the manufacture of these substances may be augmented. This line of treatment has already shown excellent results in selected cases and gives great promise for the future.

Can we help the opsonic and phagocytic actions? Here vaccines again promise to be of value, but at present their use in acute cases has not been determined. There are, however, several substances which increase the number of leucocytes. Credé introduced the use of collargol, an organic compound of silver, with this object. It can either be injected into the veins in doses of one to two

grains in water once a day, or ʒj of Credé's ointment (collargol gr. xvij to ʒj of lard) may be rubbed into the thigh once a day, the remnants of the previous inunction first being washed off with soap and water. Credé has strong belief in its power and we have sometimes thought its action was beneficial.

Rectal and subcutaneous injection of saline also increases leucocytosis and probably increases the complement in the serum.

Can we help the antitoxic action? Many antitoxic serums have been prepared. Lately polyvalent antistreptococcic serum, which, however, is probably rather a bactericidal serum, has aroused most interest. Personally we have found antitoxic serums disappointing when the disease is well established. As a prophylactic in a suspected case, or if given in an established case at the very beginning of septic symptoms, we think we have found it of value. These serums also increase leucocytosis, and in this way may prove beneficial even when not obtained from the special strain of bacteria responsible for the infection.

It is necessary to discover the presence of streptococci or staphylococci in the uterus before using a serum. The distinguishing of bacillus coli must be left to bacteriologists, though the presence of a bacillus in the uterine lochia, with a shaggy endometrium and foetid lochia, is clinically diagnostic of its presence.

How to procure and examine the uterine lochia. (1) A Fergusson's speculum of large calibre or a posterior speculum, (2) a pair of bullet forceps, (3) some sterile wool, (4) a piece of glass tubing, with a slight bend, about eight inches long previously sterilized, (5) a syringe and piece of rubber tubing which have been boiled and can be attached to the glass tube, are the instruments required.

The patient is in the cross-bed position. No anaesthetic is needed. The vulva is cleansed, but the vagina is not douched. Your hands are clean and gloved, and the apparatus is in a sterile dish of boiled water on a chair. Insert Fergusson's speculum. Wipe the cervix clean with the sterile wool. Pass the piece of glass tubing into the

uterus as far as possible. Fasten on the rubber tubing and syringe, and suck some of the lochia into the glass tube. Drop a few drops of lochia on glass slides at once and then seal both ends of the piece of glass tubing with sealing-wax and send the tube to a bacteriologist. By spreading the lochia thinly on the slides, letting it dry, fixing by passing three times through a Bunsen flame and staining with methylene blue, streptococci, staphylococci, diplococci, or bacilli can be detected by microscopic examination.

Use of antibacterial serums. Serums against streptococci and staphylococci are on the market. These are injected into the patient's loin. 10 c.c. to 30 c.c. is the usual amount given every twenty-four hours. The effect on the temperature is carefully noted. If the serum is without effect after three doses, it is of no advantage to continue its use.

Can we help the supply of the antibacterial substances of the body to the affected part? We have seen that our power of helping the manufacture of these antibacterial substances is practically nil in the most acute cases, but in chronic and stationary cases we can add materially to their formation. We also have some power over the supply of the body's antibacterial substances to the affected part. The substances are supplied by the blood stream. We have means by which we can increase the flow of blood to the uterus and pelvic organs.

Inflammation itself brings increased streams of blood to the regions of microbic attack. If the intensity of the microbic poison is very great, stagnation of the blood supply results and the phagocytes and antibacterial substances of the serum are unable to reach and overcome the bacteria. The amount of lochia is a test of the amount of serum that is escaping from the infected uterine wall. In severe cases of sepsis the lochia dries up. The significance of this scanty lochia is clear and is of evil omen.

Methods of increasing the blood and lymph supply to an infected uterus. When, therefore, in a case of acute sepsis the lochia decreases or dries up, it seems rational to use means to again make it flow freely.

The only efficient local treatment which draws blood to

the part is the hot douche. Douches for this purpose may be given night and morning.

Another local method has been introduced by Bier. Bier scarifies the cervix and applies a suction pump to it to cause local congestion. The funnel and stem of the pump are made of stout glass and the ball of strong rubber.

Citric acid has the power of increasing the transudation of blood and lymph through the tissues and of helping their flow through the vessels by diminishing the coagulability of the blood. One drachm of citric acid given every three hours for twenty-four hours to a normal person sometimes results in nose-bleeding and subcutaneous haemorrhages. We have given one drachm every four hours in hospital and half a drachm four-hourly in the extern department to septic cases, in which the lochia has dried up, until a free discharge of lochia was established. It is difficult to say whether it did good, for we have not had many cases in which to try it. All that can be said is that it seemed to do good and the patients like it. It should not be given if the lochia is abundant.

Pryor's treatment. In those cases of sepsis that have resisted milder treatment or in seriously septic conditions that have not been favourably influenced by minor measures for two or three days, we strongly advise a method of treatment recommended by Pryor. It is easy to carry out and can be done at the patient's house.

Put the patient in the cross-bed position. With strict aseptic precautions wash out the uterus and pack it with iodoform gauze. Put in a posterior speculum, pull down the cervix with bullet forceps on the posterior lip, and thus expose the posterior fornix. Incise the mucous membrane of the posterior fornix transversely for about an inch, at the vaginal and cervical junction, which is found by moving the cervix up and down a few times. Insert two fingers into the wound and enlarge by tearing, thus avoiding possible injury to the uterine arteries and ureters. Open the peritoneum with scissors and stitch it to the edge of the wound. This stops haemorrhage and prevents infection of the extraperitoneal tissues. Leave the sutures long to

control and steady the opening of the wound. Put the patient in the Trendelenberg position, by means of books under the side legs of the bed, if operating at her home (see p. 296). This gets the intestines out of the pelvis and their place is taken by gauze. Pack Douglas's cul-de-sac with a long strip of iodoform gauze.

Remove the uterine gauze in twenty-four hours, but leave the pelvic gauze for three days. Douglas's pouch is thus drained of stagnant peritoneal fluid, and, more important still, a localised peritonitis is set up, which shuts off infection. The gauze by irritation produces a further flow of lymph and limits the spread of inflammation by fresh adhesions, which are well channelled by lymph passages.

Can we prevent further attacks of bacteria? Here we have more scope. We can prevent, by the scrupulous cleanliness of our douching and examinations, the entry of other germs and the added danger of a mixed infection. Above all, if anywhere in the genital track there is pabulum on which bacteria can grow and multiply, and this pabulum is removable, we should remove it. Otherwise it forms a base from which fresh hosts of organisms can issue to attack the body. The power of the body to overcome these added numbers has to be greater in proportion, is often severely taxed, and may be entirely overcome.

For this reason, if there should be a puerperal ulcer, it is thoroughly cleansed by antiseptics and dusted with iodoform.

If there is no ulcer, lochia retained in the vagina must be washed out by a douche. Lochia retained in the uterus, owing to ante flexion or retroflexion, must be let out by straightening the cervical canal, followed by an intra-uterine douche and a gauze drain. Remnants of afterbirth, with the crowds of bacteria that are growing upon them, must be removed by manual exploration of the uterus.

Finally, rest in bed prevents the re-inoculations from the microbic area that follow its disturbance by exercise.

CHAPTER XVI

CLINICAL VARIETIES OF PUERPERAL INFECTION

**Breasts—Constipation—Retained Lochia, Vaginal; Uterine
—Puerperal Ulcer—Perineum—Retained Membranes
—Sapraemia—Putrid Endometritis—Acute Lymphatic
Sepsis—Peritonitis—Acute Venous Sepsis—Pyæmia—
Phlegmasia Alba Dolens—Inflammation of the Breasts.**

HAVING described the general principles of puerperal infection we now proceed to detail the various kinds of puerperal infection and apply the above principles to their treatment.

Examination of a puerperal woman with fever and rising pulse. The temperature and pulse should be recorded at

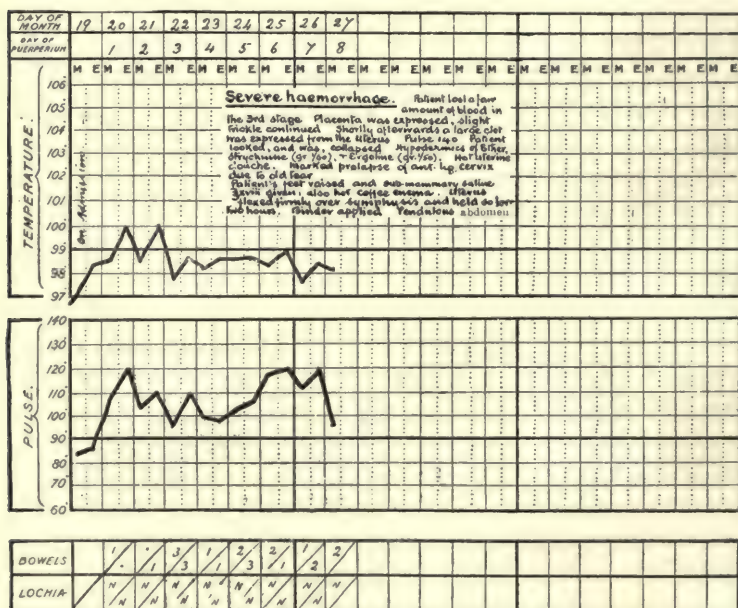


FIG. 141. Chart of severe haemorrhage. (Notice Pulse Chart.)

least twice a day. At every visit look at the tongue; examine the pads on which the lochial discharge has been collected; look at the breasts; and note the height of the uterus above the pelvis and the condition of the perineum and vulva. If she has a temperature taken in the mouth above 99° F. or a pulse above 90, look for some cause. Remember that the patient may have some general illness such as phthisis. Severe haemorrhage at delivery may give the pyrexia and the rapid pulse of haemorrhage. Even though she has some general disease, do not be satisfied that this is the cause of the temperature until the far commoner cause of puerperal infection has been excluded.

Our method of estimating morbidity is as follows:—A patient is considered morbid if her temperature and pulse, taken twice daily, rise above 99° F. and 90, respectively, on three consecutive takings, counting from the beginning of the second day to the time of discharge. Temperatures are always taken in the mouth.

THE BREASTS

Sometimes from the third or fourth day onwards the breasts are hard, knotty, and tender, with or without flushing

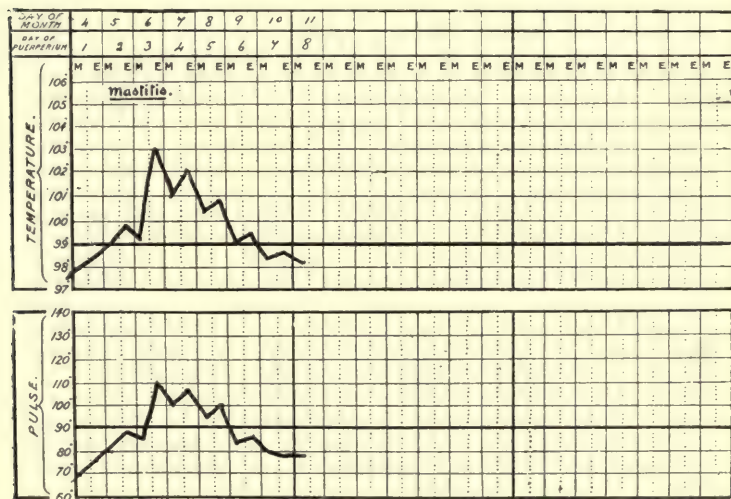


FIG. 142 Chart of mastitis.

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of the superficial skin. Mastitis, or inflammation of the breasts, is present and causes a rise of temperature and pulse. We deal with mastitis later on. There is no other sort of fever arising from the breasts, except that due to mastitis. The 'milk fever' which is supposed to occur on the third or fourth day owing to the filling of the breasts, is not milk fever at all, but is some form of puerperal pelvic infection. The great majority of our patients get their breasts filled with milk without any rise of temperature or pulse whatever. When there is a rise at this time it is due either to uterine or vaginal infection or other definite cause.

NERVOUS INFLUENCES

This has already been dealt with as a cause of raised temperature.

CONSTIPATION

The concurrence of constipation and a raised temperature and pulse-rate in the early days of the puerperium is very frequent. We have had a patient with a sudden rise of temperature to 104° F. and pulse to 120, both of which fell to normal after the bowels had been opened. The reason usually stated for this pyrexia is that a puerperal woman absorbs toxins from her faeces, while a normal woman does not. We are doubtful if this is the explanation. In the recumbent position in bed which is assumed by puerperal civilized women there is not the free drainage of lochia from the uterus and vagina that there is in the uncivilized woman, who goes about her business after delivery is finished. When the bowels of a patient are opened in hospital, she sits upon the chamber in bed, and thus provides a freer drainage of her lochia by gravity. The action of the abdominal muscles, the peristalsis of the rectum, and the straining, also tend to squeeze out the lochia. By giving our hospital patients a dose of *Mist. Sennae Co.* on the second night after the delivery, we encourage a free action of the bowels, necessitating frequent sittings-up on the chamber. In private practice we do not object to patients sitting upon the chamber in bed in order

to evacuate the bowels. For the same reason patients are allowed to turn over on the hands and knees to pass water in the first twenty-four hours, unless they have suffered from shock or collapse.

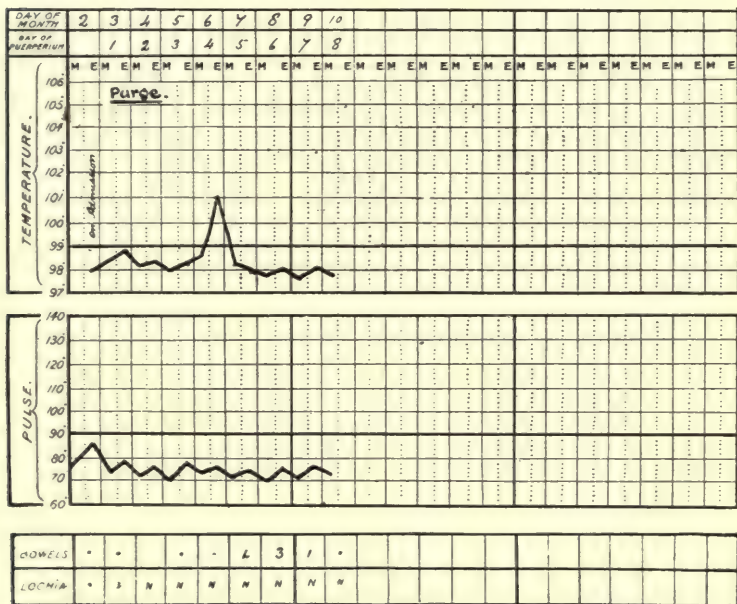


Fig. 143. Effects of purge on temperature curve. (Notice Pulse Chart.)

RETAINED LOCHIA IN THE VAGINA

The vagina of many puerperal women is very capacious, and, in the recumbent position, lochia tends to collect in a pool in the floor of the upper part of the vagina. Especially is this likely to be the case after the perineum has been stitched. This retained lochia tends to become foetid. The pulse quickens and there may be a slight rise of temperature owing to septic absorption. The perineum when examined is found healthy.

Treatment. If we find the temperature a little raised and the pulse-rate a little increased, with foetid lochia, we first try the effect of raising the head of the bed.

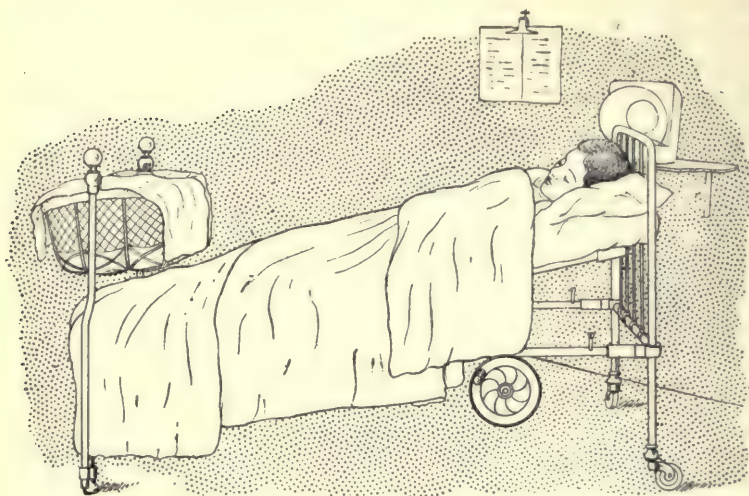


FIG. 144. The bed now used at the Rotunda. It is raised or lowered by turning the wheel.

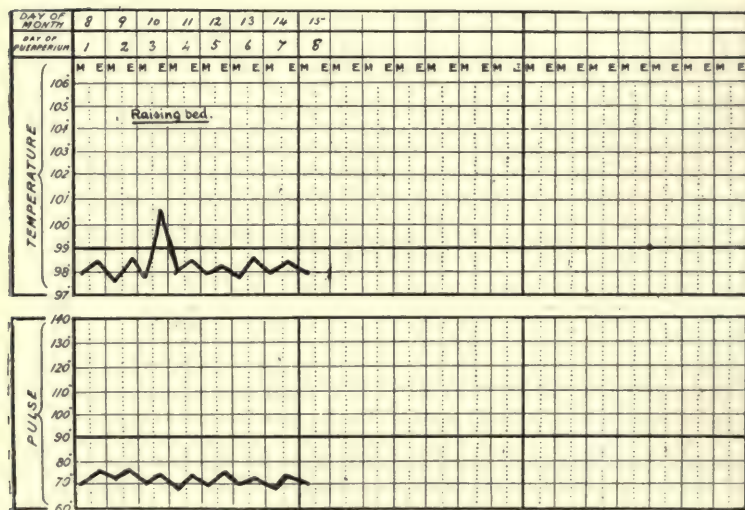


FIG. 145. Effect of raising the bed in a case of sapraemia.

Quinine and ergot. Both of these drugs have the power of making the uterus contract, so in these cases and in other cases of raised temperature, which are not accompanied by constitutional signs of any note, we give a single dose of quinine gr. x. It is a good general rule, too, in all cases of puerperal infection to give $\bar{3}j$ of ergot night and morning. Both of these drugs are given for the above reason solely. Involution in these cases is frequently deficient and ergot opposes this deficiency by making the uterus contract.

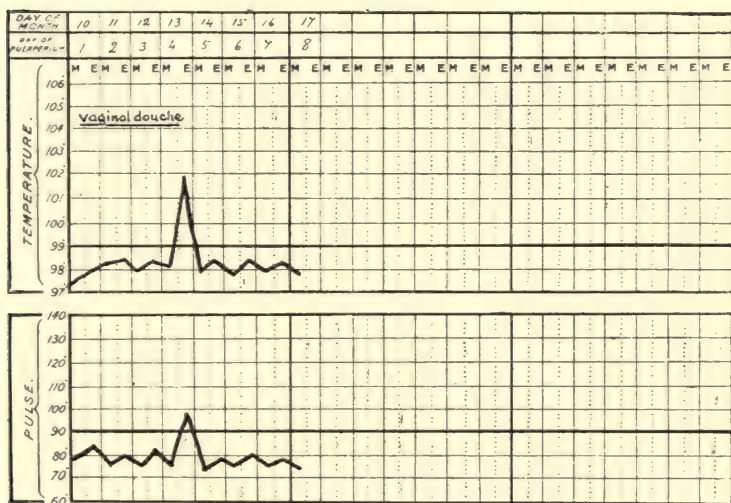


FIG. 146. Effect of a vaginal douche in sapraemia.

Vaginal douche. If the signs have not abated within twelve or twenty-four hours and there is no puerperal ulcer, we give the patient a vaginal douche. The warmth of the vaginal douche has the additional merit that it makes the uterus contract. While giving the douche we make a vaginal examination to see if the fundus of the uterus has sunk into the anterior vaginal wall (anteflexion) or posterior vaginal wall (retroflexion).

If the case was one of vaginal retention, this douche suffices, but we still keep the bed raised.

RETAINED LOCHIA IN THE UTERUS

It is not uncommon after the second day to find the uterus acutely anteфлекed. Retroflexion also occurs, but it is less common in our experience. The heavy fundus falls forward on the soft lower uterine segment as on a hinge. The cervical canal is sharply kinked and the lochia collects in a pool at the fundus.

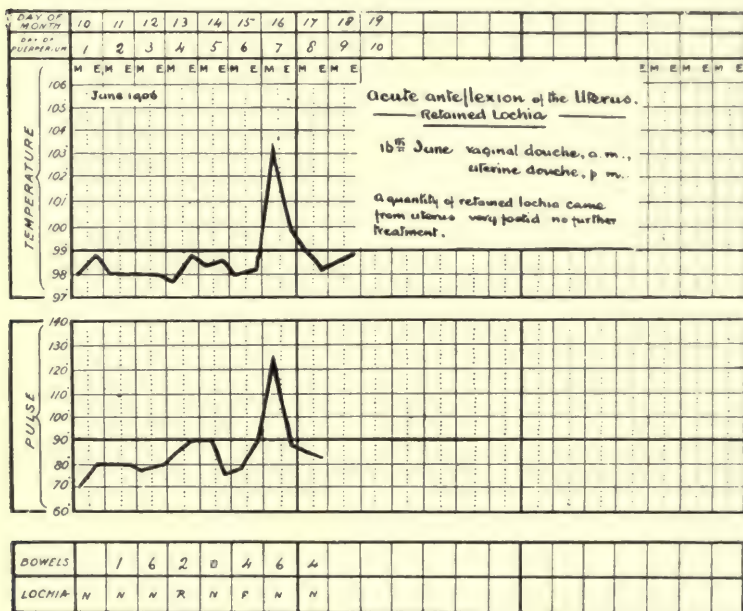


FIG. 147. Retained lochia.

Diagnosis. It is sometimes possible to diagnose acute ante- or retroflexion by the sudden dropping of the uterus, as felt abdominally. One day, for example, the uterus is felt a finger's breadth or so below the umbilicus, and the next day it cannot be felt at all, or it is almost at the level of the pelvis.

Give a vaginal douche, if the temperature and pulse have not fallen with purge, quinine, and raising the head of the bed. Make a vaginal examination, and in these cases you feel the body of the uterus sunk down into and bulging

the anterior vaginal wall. The cervix is high up in the vagina. Pass two fingers or the half hand into the vagina and insinuate one gloved finger into the cervical canal. The finger passes the kink, straightens out the cervical canal, and at the same time some putrid lochia runs out of the uterus.

Or give an intra-uterine douche. The large Bozemann's catheter enters the cervical canal, but it does not pass readily into the uterus. On examining for the cause of the obstruction the kinking of the cervical canal is found.

Retroflexion of the uterus presents the reverse picture to the above.

Treatment. The patient is in the cross-bed position for the douche. After straightening out the cervical canal, collect some lochia for a culture and douche the uterus. Then take a sterile piece of iodoform gauze in plugging forceps, soaked in 2 per cent. carbolic solution, and, guiding the forceps with two fingers in the vagina, pass it through the cervical canal up to the fundus. Remove the gauze within twenty-four hours. Antelexion is not likely to recur. If the temperature again rises and if antelexion or retroflexion recur, repeat the above treatment. As long as drainage keeps the pulse and temperature normal no further treatment is needed.

PUERPERAL ULCER

A puerperal ulcer results from unstitched or infected vaginal and perineal tears or from sloughing of the mucous membrane due to traumatism and infection.

Always before douching a patient examine the perineum and neighbouring parts of the vagina to see if a puerperal ulcer is present. In clean midwifery puerperal ulcer is very rare. A puerperal ulcer is a sloughing area with raised edges, purulent discharge, and a greyish white membrane on its base. The labia are often much swollen.

Treatment. Avoid all douching when a puerperal ulcer is present, for fear of carrying its virulent infection up into the parturient canal. Remove any perineal stitches, and

paint the ulcer with tincture of iodine. Sprinkle the cleaned and dried surface with iodoform. If there is much oedema round the ulcer hot boracic fomentations changed four-hourly are good. In short, the treatment is not different from that of other foul ulcers.

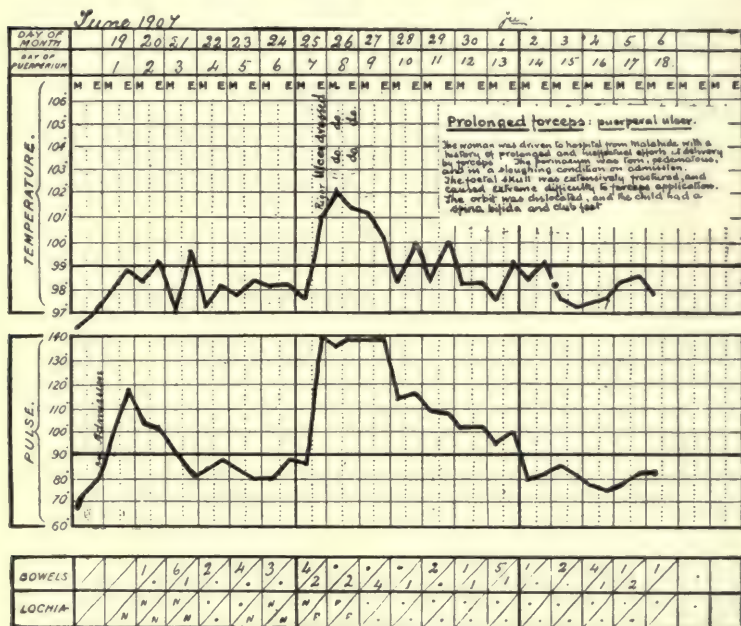


FIG. 148. Puerperal ulcer.

UNHEALTHY PERINEUM

After a perineum has been sewn, one usually finds a little whitish discharge upon its surface, which is of no moment. Sometimes, when the stitches have not reached the full depth of the wound, a pocket is left in which blood or lochia may collect and decompose, forming a small abscess tender to pressure.

Treatment. Take out the stitches and cleanse the wound with biniodide of mercury and iodoform powder.

RETAINED MEMBRANE OR PIECE OF PLACENTA. SAPRAEMIA

The germs are usually those which cause putrefaction, although streptococci and staphylococci may be found in the lochia. Putrefactive organisms can live on dead or dying material but cannot overcome the resistance of healthy

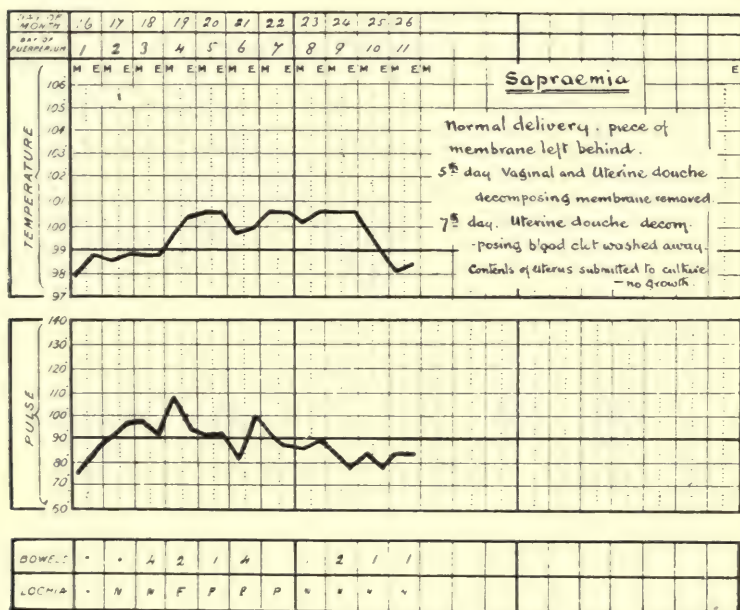


FIG. 149. Sapraemia. Retained membranes.

living tissue. Therefore their habitat will be retained placenta, membrane, blood clot, or lochia in the uterus or vagina. In this medium they manufacture toxins which are readily absorbed, and to them are due the constitutional symptoms, which depend on the dose and virulence of the poison. A large dose can be the most rapidly fatal of any form of infection. In puerperal sapraemia the dose is seldom or never so great as to cause such rapid death. Indeed, when cases are properly treated, recovery may be expected with comparative certainty.

Treatment is directed to the removal of the foreign body or to cleansing the puerperal ulcer. Thus when a patient's

temperature and pulse show signs of septic intoxication we examine the vulva and vagina carefully to see if there is a puerperal ulcer. If there is not, a vaginal douche and ten grains of quinine are given and the bed raised. If the next temperature shows no signs of reduction a uterine douche is given. If this does not cause immediate improvement the uterus is explored manually.

Diagnosis. When the afterbirth is delivered, some membrane may be left behind in the uterus. Leave it, because it commonly comes away in the lochia in a few days and

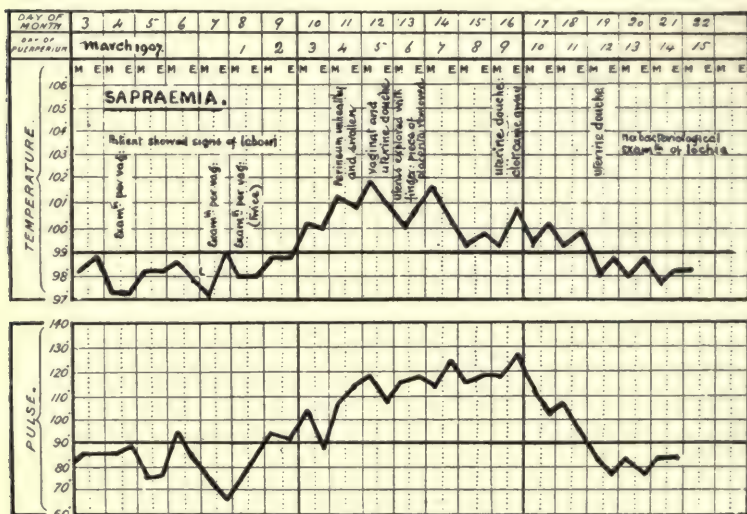


FIG. 150. Severe sapraemia. Retained placenta.

causes no trouble. But if the temperature and pulse begin to rise, remember that in the uterus there is a pabulum upon which bacteria can feed.

Or, if a piece of membrane comes away with the lochia, although its retention in the uterus had not been suspected, and the temperature and pulse begin to rise. Again there is a pabulum in the uterus upon which bacteria can feed.

When the temperature does not fall to normal after douching the probability is that there is lochia, membrane, or a piece of placenta retained in the uterus.

In all these cases without exception the lochia will be abundant and either heavy or foetid.

Rarely, a smart haemorrhage will be the first indication that a piece of placenta has been retained.

Course and treatment. Sapræmia due to retention of a piece of afterbirth usually begins to give signs of its presence about the third or fourth day, the same days in fact on which the milk comes into the breast. The lochia becomes heavy or foetid and stains the linen in an abnormal manner, the pulse-rate increases, the temperature rises. The patient does not appear to be very ill, although she may have some headache and loss of appetite. Give an intra-uterine douche. Moving the Bozemann's catheter about in the uterus may dislodge some pieces of membrane. Put in a wick of gauze as a drain. The immediate result of the intra-uterine douche may be that the temperature shoots up another two degrees. The disturbance of the uterine cavity causes increased absorption of toxins, resulting in a negative phase. The positive phase follows, but unless the temperature and pulse reach normal or nearly normal within twenty-four hours, and the lochia is no longer offensive, do not wait any longer, but explore the uterus. If, when the temperature first begins to rise, there is strong suspicion or actual knowledge that it is a case of sapræmia, do not waste time with quinine or vaginal douches, but give an intra-uterine douche and lightly pack the uterus with gauze. This gauze sometimes entangles the retained membrane, and when it is pulled out within twenty-four hours the membrane comes with it. If this fails to improve the patient definitely, remove the retained bits of afterbirth by manual exploration of the uterus.

If this is not done, there is constant fear that acute sepsis or invasion of the body by living organisms will supervene, with rigors, rapid pulse, high irregular temperature, severe headache, insomnia, and inflammation of the pelvic cellular tissue or pelvic peritonitis.

Exploration of the uterus. An anaesthetic, preferably ether, will be needed only if the patient is nervous.

For the rest, the treatment is similar to the removal of

retained bits of membrane or placenta causing post-partum haemorrhage. The patient is in the cross-bed position, the vulva cleansed, the bladder emptied, the vagina douched. Put the whole hand gloved into the vagina and as many fingers as possible into the uterus. Later in the puerperium, two fingers will suffice. There is no difficulty in passing through the puerperal os. The exploration of the uterus is facilitated by pressing its walls down by the other hand on the abdomen. Pull away as many pieces of retained membrane or bits of placenta as possible, and then roll up a bit of gauze and wipe the uterine walls with it, steadying the uterus the while by the hand on the abdomen. Be sure that there are no fragments left. The placental site always feels rough, and has a few shreds of blood clot attached to it. Douche the uterus thoroughly and lightly pack the cavity with gauze. The temperature may rise after the exploration. Take out the gauze next day, and from this time onwards the lochia should be normal and the patient restored to health. It may be necessary to give a few more intra-uterine douches before recovery, but the uterus need not be explored again.

A woman with a temperature above 100° F. should not nurse her baby as long as the fever lasts.

PUTRID ENDOMETRITIS

In some cases, the whole interior of the uterus is shaggy, and a quantity of easily detachable matter can be scraped away from any part. The discharge is abundant and offensive. The case is one of putrid endometritis, with which is practically always associated infection by the bacillus coli. Explore, douche, and drain the uterus, but the abundant foetid lochia may still continue. Do not again explore, but douche out the uterus night and morning with creolin solution as long as foetid pus collects in the uterine cavity. It is usual to employ a mild antiseptic for this purpose, although it is often stated that normal salt solution is better. The weak antiseptic cannot kill the bacteria, but may to some extent devitalize the living tissues which are

acting as a barrier to bacterial invasion, and are, under favourable circumstances, able to kill the organisms.

We are quite ready to give full weight to this view, but in practice we still adhere to the mild antiseptic. It may not kill the germs, but it will certainly inhibit their growth. It will also to some extent disinfect the utensils used for the douche, which is an important consideration in private practice.

Vaccines prepared from cultures of the uterine discharge is a form of treatment for which there seems great promise.

The patient is likely to be very ill, and will not easily digest solid food, therefore treat her as any other case of exhausting infection.

THE USE OF THE CURETTE IN SAPRAEMIA

The curette is not nearly so efficient as manual exploration. The only advantage the curette has, is that an anaesthetic is never necessary, and its use will not reopen a tear of the perineum as the hand in the vagina does. In



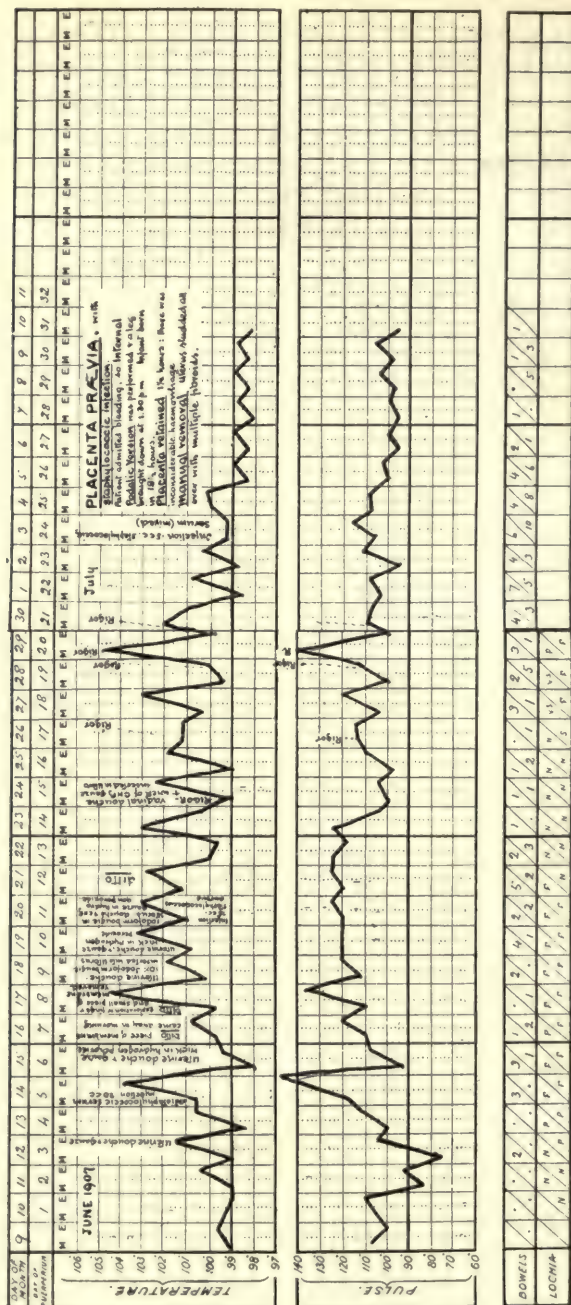
FIG. 151. Rheinstädter's flushing curette.

a mild case Rheinstädter's flushing spoon curette may be passed lightly over the uterine wall, in the hope of ensnaring bits of membrane. But we do not advise any greater reliance than this to be placed on curettage. In putrid endometritis, the curette has no place. The sharp curette should never be used in the puerperal uterus.

The spoon sold at present is not the original Rheinstädter, which was so large and blunt that softened muscle could not be injured. Its shank was so ductile that it would bend when undue force was used and lessened the likelihood of uterine rupture.

ACUTE PUERPERAL SEPSIS

Acute puerperal blood-poisoning, in other words, the invasion of the body from the uterus by septic organisms, leads to so many different clinical conditions that it is impossible



to give an accurate description of a case. Symptoms may develop within thirty-six hours of infection and the patient be dead within another twenty-four hours from overwhelming toxæmia. She may first suffer from sapraemia, and septicaemia, due to living bacteria in the blood, be super-added. Rigors occur and the general condition of the patient is far worse than is customary with sapraemia. Frequent rigors may occur at fairly definite intervals, and true pyaemia may supervene. Acute endometritis with outpouring of pus and a large tender flabby uterus is another form of acute puerperal sepsis. Acute inflammation of the pelvic cellular tissue (parametritis) or of the pelvic peritoneum (perimetritis), or the two together, afford further clinical pictures. Acute pyosalpinx is another variety, but is usually associated with perimetritis and parametritis. Lastly, acute general peritonitis may end the life of the patient.

An acute infection that presents such a variety of possibilities is difficult to describe concisely. We will describe first a typical case of acute lymphatic sepsis, then deal briefly with parametritis, perimetritis, pyosalpinx, and acute peritonitis; and then go through the cause of a typical case of pyaemia. But it must be remembered that several of these conditions may be associated, and any of them may be implanted on the lesser degrees of infection and sapraemia. Fortunately, in well-conducted midwifery, acute puerperal sepsis is rare.

ACUTE LYMPHATIC SEPSIS

Onset. Acute blood-poisoning, arising from punctured wounds, may develop within twenty-four hours. But when the poisoning arises from infection of the parturient canal, there is nearly always an incubation period of thirty-six hours or more. When acute sepsis arises in less than twenty-four hours from the birth of the child, the infection probably occurred before delivery.

Symptoms and signs. These are not in any way different from acute blood-poisoning in men or in non-puerperal women.

The attack most frequently is ushered in by a rigor. The temperature as a rule rises above normal, and it is characteristic of the temperature of acute lymphatic sepsis when once raised to remain above normal. In some cases, when the infection is very violent, the temperature shows no response and may actually be subnormal. With or without pyrexia, the other symptoms of a toxic fever appear. The patient has a severe headache, she is thirsty, hot, and flushed.

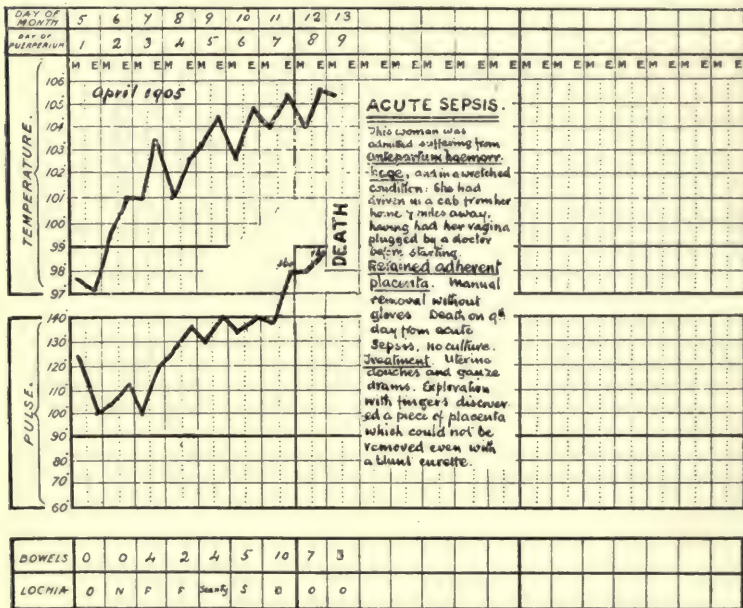


FIG. 153. Acute sepsis. Death.

The lochia is much diminished or absent and typically not foetid. The breasts are unchanged, except that the flow of milk diminishes or ceases. The tongue, usually at first furred and then dry and brown, may yet be moist and clean throughout the illness.

Hence, a case of acute sepsis may present a normal or insignificant temperature, no lochial changes of any note, no breast changes, and a clean, moist tongue—a group of symptoms which is very misleading. But if careful to feel

and count the pulse, you will always be warned of the true condition of the patient. The pulse rises progressively and becomes feebler, until it is uncountable before the final issue of death. The next most reliable sign of acute lymphatic sepsis is the severe and intractable insomnia, and, thirdly, we attach significance to restlessness. The patient is conscious almost to the last, but she is querulous, unhappy, and apprehensive, instinctively fearing the terrible danger that threatens her.

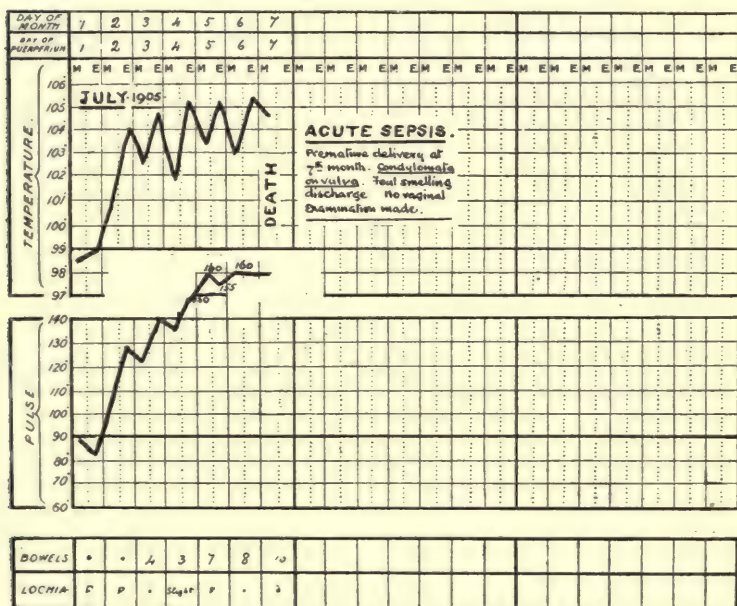


FIG. 154. Acute sepsis.

Diarrhoea with passage of undigested food, distension of the abdomen, and vomiting may all occur without peritonitis. Cutaneous rashes are common. The uterus involutes fairly, and is not tender. On the third or fourth day, if the patient survives, the clinical picture may change. The patient says she feels much better, that she is weakened by lying in bed and would like to get up, or she thinks she would get well if only she could sleep better. But this change from apprehension to hopefulness, known as euphoria, is one

dreaded much by the experienced obstetrician. He does not share the delusion of his patient, and knows that when a patient says she is much better, and yet her pulse is faster and feebler, she is sure to die. He sees also how her pinched and sallow face, her pale, tremulous lips, and the fine tremor of her hands belie her hopeful words. In a few hours, or a day or two, she sinks into unconsciousness and dies.

Prognosis. It is not possible to say how fatal acute lymphatic sepsis is from statistics, for statistics depend on what the individual considers as acute lymphatic sepsis. For our part we look upon the true disease as almost invariably fatal. A case in which the patient vomits, has diarrhoea, frequent rigors, and insomnia, is very hopeless. The condition of the pulse is the best test of the state of the patient.

Autopsy. The condition of the body after death is the same as that following other acute toxaemias. There may be a little local peritonitis or some pus in the tubes. The interior of the uterus is smooth, its wall is firm. To the unaided eye it may look unaffected. But when a section is cut of the uterine wall and endometrium, and examined with the microscope, the true condition of the disease is seen. The lymphatics of the uterine wall are invaded by bacteria, and the leucocytic infiltration that should oppose them is either absent or meagre. The victory is clearly with the bacteria, which have not stopped to feed on some remnant of afterbirth, but have rapidly invaded the living tissue of the uterus, and may be found elsewhere living in the blood and lymph streams.

The streptococcus is practically always the offending organism, though often associated with others.

Treatment. In a disease of such a hopeless character treatment is not of much avail.

The onset is so marked with rigor and definite severe illness, that one does not think constipation or some trifling condition is the cause of it. First take the baby from the breast. Raise the head of the bed to promote drainage and to limit peritonitis to the pelvis, if possible. Take

a culture from the uterus and explore it manually in the hope of finding some remnants of afterbirth, and, if so, a wrong diagnosis. If there is nothing but a smooth uterine wall, further local uterine treatment is not only of no avail, but is probably harmful. Therefore do not give any uterine douches.

In the general consideration of sepsis we pointed out that scanty lochia meant that the lymph and blood were not reaching the infected part in the same amount as in inflammations in which the body processes overcome the microbic invasion. Our treatment, then, is to attract blood to the part. This we do by giving hot, low vaginal douches night and morning, and citric acid (half a drachm every four hours), and are glad if we see a more abundant lochia as the result of this treatment.

We also rub in ʒj of Credé's ointment (collargol gr. xvij to lard ʒj) or give collargol intravenously, and also adopt Pryor's treatment to increase the number of leucocytes.

Polyvalent anti-streptococcic serum (20 or 30 cc.) may be injected into the loin every twenty-four hours. When given as a prophylactic in cases where septic infection was suspected, we think it does good. Also if given in the initial stages. If given later we have not noticed any definite effect.

If the patient is thirsty encourage her to drink freely. Subcutaneous injections of saline may be tried. In the last stages, when she is vomiting and has diarrhoea, no treatment is of any avail.

The rest of the treatment is similar to that of other acute fevers, namely, liquid diet, and the general treatment that comes under maintaining the patient's strength, and attending to the bowels. Abundant fresh air is valuable.

We do not think morphia a very good hypnotic, for the sleep given is not restful.

Cold sponging or a cold pack or cold bandages to the head reduce the fever, and often make the patient sleep.

In our experience alcohol in either small or heroic doses has little effect on the issue.

PUERPERAL PELVIC INFLAMMATION

Parametritis, perimetritis, and salpingo-oophoritis. Parametritis is inflammation of the pelvic cellular tissue, perimetritis of the pelvic peritoneum. Salpingo-oophoritis, inflammation of the ovary and tube, in most cases occurs in association with them. From the obstetrician's point of view they may be grouped together as Puerperal Pelvic Inflammation. The differential diagnosis and differential treatment belong to gynaecology.

Paths of infection and pathology. The endometrium of the uterus may first become affected, as in sapraemia or in pyaemia. A reactionary endometritis occurs. The endometrium pours out pus or foul discharge. The uterus is large, soft, tender, and does not involute. The inflammation spreads to the tubes, and the abdominal openings of the tubes are closed by local peritonitis. Pyosalpinx results. Sometimes the abdominal openings of the tubes are not closed and the bacteria cause a perimetritis. Parametritis and perimetritis may occur apart from pyosalpinx, the infection spreading directly through the wall of the uterus or tubes.

Signs and symptoms. The patient for the first few days of the puerperium is fairly well, but the temperature, pulse, and general signs disclose some slight puerperal infection. The temperature or pulse are a little raised, the lochia is not normal, and the uterus does not diminish in size as quickly as usual. With regard to involution, in quite normal cases one sometimes finds that the uterus does not apparently alter in size for three or four days together. Again, the signs of puerperal infection may be more severe, the temperature and pulse definitely raised, the lochia foetid, and the uterus large, soft, and tender.

Then, at the end of the first week or later, a rigor occurs, the temperature rises to 103° or 104° , the pulse rate increases, and the characteristic symptom of severe pelvic infection appears, namely, severe abdominal pain. It is this severe pain, comparable to the acute pain of appendicitis, that suggests the presence of acute pelvic inflammation. Ac-

companying it there is tenderness over the hypogastrium, and usually rigidity of the muscles. The patient is ill, with signs similar to the better known symptoms of acute appendicitis, namely, she is hot, feverish, has headache, sickness, and probably the bowels are confined. In just the same way the inflammation after a few days may subside; a large serous effusion may form; or abscesses may result; and more rarely general peritonitis ensues; adhesive inflammation may follow, and the disease may become chronic. The differential diagnosis of these conditions and their sequelae belong to gynaecology.

Treatment. Take the baby from the breast.

Raise the head of the bed, so that the intestines fall down into the pelvis, and by their adhesions limit the spread of the inflammation.

Explore the uterus once gently at the onset, and make sure that there are no remnants of afterbirth.

No further local treatment of the uterus is indicated.

Hot, low vaginal douches once or twice a day relieve pain, but in a reactionary inflammation, in which leucocytosis is well marked, neither collargol nor citric acid are indicated.

Hot stupes to the hypogastrium also relieve pain, and a pillow or bolster under the knees relaxes the muscles and makes the patient more comfortable.

Except at the outset, when pain is very severe, we do not give morphia.

For the rest, the general treatment is similar to that in other cases of acute abdominal inflammation, such as appendicitis. When an abscess forms, as evidenced by continued fever and a tender mass behind or at one or both sides of the uterus, open it and drain it, either through the vagina or abdominal wall, as the case may be. Through the vagina is the safer method, and can be done by incising the vaginal wall over the tumour and plunging in a sinus forceps. When general peritonitis occurs the peritoneal cavity should be opened and drained. Otherwise, treat expectantly, but be prepared for relapses and later for the pain of adhesions.

ACUTE GENERAL PUERPERAL PERITONITIS

This does not differ from other kinds of acute general peritonitis either in signs, symptoms, or treatment. The only treatment for this almost hopeless condition is free drainage through the abdominal wall and Douglas's pouch, and continuous rectal irrigation with normal salt solution.

PYAEMIA, OR ACUTE VENOUS SEPSIS

Pyæmia is a more common puerperal infection than acute lymphatic sepsis. The germs that cause acute venous sepsis are the same as those that cause acute lymphatic sepsis, though staphylococci are said to occur rather more frequently in the former than in the latter form of infection.

The name pyæmia is not so good as acute venous sepsis, for though distal abscesses usually form, they do not invariably do so, and the name acute venous sepsis contrasts better with acute lymphatic sepsis.

Path of infection. Pyæmia arises most frequently from the placental site. Here are venous sinuses in abundance. During the removal of a retained or adherent placenta local infection may occur, or a piece of placenta, being left behind, may give a chance for bacteria to develop. The venous sinuses are occluded by blood clots. The bacteria become implanted on the blood clots and loosen them by peptonization. This peptonization has to occur before the characteristic symptoms set in. The onset is for this reason late. Acute venous sepsis begins as a rule about a week after the birth of the child, but it may not occur until three weeks after birth. In the latter event, the onset of pyæmia may not occur until after the doctor or nurse has terminated the attendance, and mistakes arise in this way.

Signs and symptoms. Probably in all cases the onset of pyæmia is preceded by signs of puerperal infection.

The actual onset is sudden. Either before or after the patient has got up from her bed, she feels a sudden chill, her teeth begin to chatter, her lips are blue, and her face is drawn and pinched. Both her temperature and pulse-rate rise, the former reaching quickly up to 104° or 105°. Then

follows a profuse perspiration, and the temperature and pulse again fall to normal, and the patient feels quite well. The patient says she has caught cold, but that she went to bed, got into a perspiration, and now feels well. Her temperature and pulse are normal. There seems to be no cause for alarm, and a mistake in diagnosis is easily made. But a few hours later, or the next day, another rigor followed by perspiration gives the true significance of the first. The patient has not caught cold, but she is at the beginning of a severe and frequently fatal illness, namely pyaemia. The lochia may be foetid or red lochia may have persisted.

There is a notable difference between the pulse and temperature in this disease and in acute lymphatic sepsis. In the latter, when once the temperature has risen above normal, it remains above normal, and when once the pulse-rate has increased, it continues to become more and more rapid until death. In pyaemia the pulse does not indicate by its rapidity the presence of a dangerous infection. The pyaemic infection is not a continued infection like acute lymphatic sepsis. The bacteria, and their toxins, are not continually dribbling into the system on the slow lymph stream. Rather it is a spasmodic infection, and the invasion of the system by bacteria is sudden and temporary. It has long been taught that this spasmodic character of pyaemia, with its sudden rigors, is due to the dislodgement of septic thrombi from the veins into the blood stream. It seems highly probable that this is so, for after a rigor a new train of signs often arises. The patient may become paralysed or speechless; she may develop meningitis; she may get a violent stitch in the side, which is followed by pleuritic effusion and empyema; she may get septic pneumonia; she may get severe pain in a joint, followed by purulent arthritis; she may get malignant endocarditis; she may get subcutaneous abscesses (these, it may be added, are of favourable import); in short, there is hardly an organ in the body in which one of these septic emboli may not lodge.

As the disease progresses, the intervals between the rigors become shorter, or the incidence of complications causes a continuous intoxication, and both temperature and pulse-

rate are permanently raised. The patient becomes weaker, and dies as in acute lymphatic sepsis.

In other cases pyaemia takes on a more chronic form. Abscess after abscess forms, and should be opened. The patient is weak, and her face sallow, but after a prolonged and trying illness she finally recovers, though frequently crippled by stiff joints and permanent invalidism from pelvic disease.

Prognosis. Although pyaemia is a chronic disease, yet its final issue is frequently fatal. It is never safe to give a good prognosis, for many sudden complications arise. Suppurative meningitis, septic pneumonia, malignant endocarditis, occur without warning.

Treatment. Take the child from the breast.

At the onset, explore the uterus once gently, and remove any remains of afterbirth. Douche the uterus gently daily as long as the lochia is foul. Do not use the curette, for fear of dislodging septic thrombi.

Hot, low vaginal douches are scarcely likely to do good, and neither collargol nor citric acid are indicated. Whenever an abscess forms, open it on ordinary surgical principles when possible.

Treatment that 'keeps the strength up' is of course needed. Abundant fresh air, such as getting the patient to live and sleep out in a sheltered balcony, is invaluable. Practitioners in the past, who saw a great deal of sepsis, placed much reliance on Tincture Ferri Perchloridi in doses of thirty to forty minims three times a day. We give it, unless it causes indigestion. We also give calcium lactate 30 gr. three times a day, hoping to prevent septic clots breaking off and entering the circulation. The bowels are kept regular, and sleep induced by hypnol, veronal, or some combination of harmless hypnotics.

The two most recently introduced forms of treatment for this condition are tying the veins in the broad ligament and the administration of vaccines. In the former treatment the difficulty lies in diagnosis between mild and severe infection. The third rigor is taken as the indication for operation. The veins can be tied extraperitoneally by incisions

above and parallel to Poupart's Ligament, or ¹ intraperitoneally through the ordinary median incision.

Vaccines are prepared from cultures of the uterine discharge or the pus from the abscess. Up to the present their greatest usefulness is in those cases that have assumed a chronic form.

Subinvolution. We describe this condition here as we are convinced that it has its origin in sepsis. In normal cases the uterine muscle diminishes rapidly and progressively in length and thickness, the fibres at the same time becoming rearranged. This diminution is largely due to fatty degeneration resulting from the anaemia caused by the obliteration of the vessels by the retracted muscle. The majority of cases of so-called subinvolution are really the result of inflammation, and the size of the uterus is not dependent so much on hypertrophy of the muscle as on hyperplasia of the connective tissue. The disease is characterized by excessive and prolonged red lochia, and may be accompanied by some fever. The uterus does not decrease in size as it should. Retention of pieces of membrane or retroflexion of the uterus may be the cause of the trouble.

Treatment. Rest in bed, the administration of ergot, and replacement of the uterus are the first essentials in treating subinvolution. The uterus should be kept up by a pessary after replacement. Hot vaginal douches stimulate the uterus to contract and may also be tried. Occasionally an intra-uterine douche may be indicated.

PHLEGMASIA ALBA DOLENS

Venous form. Sometimes the venous thrombosis spreads locally in the veins of the broad ligament, and reaches the femoral vein or other veins. Much more frequently the primary clot is in one of the saphenous veins.

Extravenous form. A rarer form of white leg follows the coagulation of the lymph in the lymphatics of the cellular tissue, occluding the vein by pressure.

Onset. Owing to the slow spread the onset is delayed.

¹ A successful removal of the veins with cure of patient has been reported by H. Jellett, Master, Rotunda Hospital, Obs. Sec. Roy. Academy of Med. Ireland, May 1912.

and may not occur until four to five weeks after the birth of the child.

Signs and symptoms. Most cases of white leg are septic, but some few are not septic.

The non-septic cases occur when the circulation is feeble, or the veins varicose. There is no raised temperature or pulse in these cases, but in other respects they are similar to septic cases.

The septic cases have usually had some signs of puerperal infection. They set in with violent acute pain in the leg, and tenderness, accompanied by fever. If the patient is up, she notices that her leg is heavy, and she feels as if she were walking on wool. When seen, the leg is tender, red, and swollen, but does not pit on pressure. The hard, tender cord of the thrombosed femoral or internal saphenous veins is readily felt. In a day or two these characters change; the leg becomes white, and pits on pressure.

The leg is a little different in the purely cellulitic or lymphatic form. The swelling is hard, and never pits on pressure. It begins in the thigh, whereas in the venous form it begins in the leg. Rarely, too, the skin may show patches of gangrene at a later stage. The two conditions are not infrequently mixed. The left leg is most commonly affected. Swelling of the one leg may be followed in a week or two by swelling of the other.

Prognosis. White leg is a local disease, and does not kill of itself. Its great danger is pulmonary embolism. We have seen a patient, who had been in bed five weeks, die in a few minutes from a pulmonary embolus, dislodged by the effort of raising herself on a bed-pan.

Treatment. The main purpose of treatment is to avoid all risk of pulmonary embolus.

Take the child from the breast.

Rest the affected leg on two pillows with the knee a little flexed, and keep the leg still by laying sand-bags on either side. The leg must be kept warm to avoid gangrene. The best way to do this is to wrap it round with wool. If there is much pain, use lint soaked in lead and opium lotion equal parts, or soaked in glycerine and belladonna, or ichthyol one

part and glycerine nine parts. Put a cradle over the leg to keep the weight of the clothes from it. Never massage the limb, and palpate it very lightly, when feeling for the swollen veins.

Give medicine so that the bowels are opened daily, for straining at stool may result in pulmonary embolism. The nurse must lift the patient on to the bed-pan. She must not help herself.

If the thrombus suppurates and forms an abscess, open it. Provided pyaemia does not ensue, the case will then get well. Give her good food, and allow abundant fresh air.

She must stay in bed for at least two weeks after the pulse and temperature have returned to normal. Massage should not be started until six or eight weeks later.

When the patient is allowed to get up she finds her leg is not as strong as the unaffected leg, and it may remain weaker for years. It feels heavy, tends to swell and ache, gets cold, and the toes are subject to chilblains in winter.

To prevent this as far as possible, tell the patient to keep the leg warm by an extra stocking. Bandage the leg firmly and evenly with a crêpe bandage from the foot up to the middle of the thigh, or get her to wear elastic stockings. Tell her to take plenty of exercise, but not to stand. We find that bicycling is efficacious in promoting a better circulation in the later stages. When she rests, it should be on a sofa with the leg raised.

INFLAMMATION OF THE BREASTS

Mastitis is divided into (1) parenchymatous, and (2) interstitial. The distinction is important, for the course and treatment of the two inflammations are different.

Cause. A cracked nipple is the usual, not invariable cause, although practically it is very unusual to find mastitis in a breast with the nipple completely free of abrasions. The interstitial variety more frequently arises from a crack at the base and the parenchymatous from an abrasion near the duct orifices.

Treatment of cracked nipple. The curing of a cracked nipple prevents the onset of mastitis. The best treatment

is to produce a false skin on the surface of the fissure. To do this, first paint the surface with cocaine (4 per cent.) to deaden pain, and then with either silver nitrate solution (gr. x to $\bar{5}$ j), friar's balsam, or glycerine and tannic acid (B.P.) twice a day. Wash the nipple free of these chemicals before the baby takes it. If suckling causes much pain, advise that a nipple shield be used until the crack is well.

Management of a nipple shield. The proper management of a nipple shield involves a few minor points. If the baby refuses to suck the shield's nipple, squeeze a little breast milk into the shield, and wet the surface of the nipple with

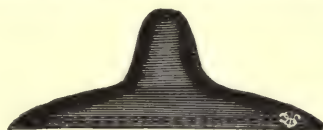


FIG. 156. Nipple shield.

the milk. This will induce the baby to suck. We scrub the shield before and after use with soap and water, keep it in a solution of washing-soda, and boil it preferably before each feed, but certainly twice a day.

Parenchymatous mastitis. In parenchymatous mastitis, the inflammation is limited by the epithelium of the milk ducts.

Signs and symptoms. It is difficult to draw the line between the tense, knotted, heavy breasts, which are overfull, and slight parenchymatous mastitis. The patient complains that her breasts feel full and are painful. On examination the breast is hot, and perhaps a little tender, and there is a wedge-shaped area of breast tissue, with the apex pointing to the nipple, harder and more tender than the rest of the knotty breast. The skin is flushed pink over this area. The patient's temperature may be a little raised, and she may feel unwell, but constitutional symptoms are usually slight.

Treatment. The child need not be taken from the breast. Sucking actually relieves the engorgement of the breast.

We apply cold boracic fomentations to the breast, covered with waterproof and wool, and firmly bandage over the wool, leaving an opening for the nipple, to permit of suckling. We do not apply poultices of any sort to either

parenchymatous or interstitial mastitis. A purge is also given. With this treatment nearly all cases get well. Sometimes the bacteria penetrate the ducts, and an interstitial mastitis is superimposed.

Interstitial mastitis.

Symptoms. This is a more serious affection than parenchymatous mastitis. The pain is greater, the colour of the skin over the affected area is dusky, there is oedema and pitting on pressure, and suppuration is almost invariable. The affected area is not wedge-shaped, but is irregularly disposed in any part of the breast. Constitutional symptoms are marked, the temperature may be up to 104° F., the patient feels ill, has headache, anorexia, flushes of heat, and may even have rigors.

Treatment. Take the child from the breast.

Before the advent of pus, the case is treated similarly to a case of parenchymatous mastitis, namely, by purging, cold boracic stupes, and bandaging. We think we have seen good results follow the inunction of an ointment composed of equal parts of mercury and belladonna ointments before the application of the stupe. Such a case is suitable for treatment with Bier's hyperaemia apparatus, which is a large bell-jar fitting over the breast. It is exhausted with a large-sized hand pump. The treatment lasts forty-five minutes every day, the cup being applied for five minutes at a time, with three-minute intervals. A small puncture is made into the indurated area before the cup is applied. This treatment is said to abort mastitis.

When the presence of pus has been diagnosed, or when a woman comes with a sinus already formed, we advise the following operation for freely draining the abscess:—

Wash the skin of the breast.

Give the patient gas or ether, but not chloroform. We have found the latter a very dangerous anaesthetic in all septic conditions.

Make an incision about an inch long over the lowest, not the reddest, part of the inflamed area. Push a gloved finger through this incision, and break down the affected breast tissue. Healthy breast tissue will resist this tearing action,

unless great force is used. The diseased tissue will readily break down, and fearlessly continue as long as it does so. When this tissue has been broken down, explore with your finger, and form a mental picture of the cavity and pockets that have resulted from the manipulation. Pass in a large Bozemann's catheter attached to a douche-can, and flush out each separate recess and pocket with creolin solution (3j to Oj). Take several long strips of iodoform gauze, soaked in 2 per cent. carbolic acid lotion. Pack this gauze strip by strip into each separate recess or pocket with sinus forceps and a long probe. At the end of the operation every part of the abscess cavity has its whole surface in contact with the gauze. If this is not so, but a pocket is left, this pocket will form the starting-place of a fresh inflammation of the breast. Cover the breast with aseptic wool and bandage it tightly, so that, perhaps, slight inconvenience in breathing is noticed by the patient. On the next day the plugs are withdrawn and some pus runs out. Again douche out the cavity and re-plug, without an anaesthetic. Repeat on the third, fourth, and fifth days. By the fourth or fifth day, only a little watery fluid escapes on the withdrawal of the plugs. Further drainage is now needless. We do not even insert a wick of gauze between the lips of the wound. Cover the breast with wool, and again bandage firmly for two days. The clean granulations adhere to one another, and the abscess cavity is obliterated. Only in the event of some pocket escaping the action of the gauze and carbolic will another abscess arise, and then it is small and readily cured by incision and drainage.

CHORION-EPITHELIOMA

Chorion-epithelioma (the correct pathological name), or deciduoma malignum, the name established by clinical usage, is a malignant uterine tumour, occurring, as a rule, immediately or soon after delivery. It arises from the two layers of chorionic epithelium, the syncytium, and the layer of Langhan's. These two layers are the modified and differentiated remains of the trophoblast.

Chorion-epithelioma occurs only after some form of preg-

nancy, either hydatidiform mole, abortion, or full term. This is the order of frequency of the preceding form of pregnancy.

Women from thirty to thirty-five are most prone to develop chorion-epithelioma, but cases at either extreme of sexual life are fairly common.

Metastases are frequent and early, particularly in the lungs and vagina.

Symptoms. Haemorrhage is the earliest and most important sign. It comes on usually immediately or soon after delivery, abnormal or normal. The bleeding is intermittent, severe, and sudden, and is associated later with a serous uterine discharge, which finally becomes dark-coloured and foul smelling. Rigors may occur and possibly lead to the wrong diagnosis of intra-uterine sepsis.

Diagnosis. With such clinical symptoms the diagnosis is made by microscopic examination of the contents of the uterus, obtained by the curette or from manual exploration if the case occur early in the puerperium.

Therefore, in the case of a patient who bleeds after delivery, particularly after vesicular mole or abortion, the contents of her uterus should be removed, and sent for examination to a pathologist, together with the clinical history to aid him in determining between the three classes of cases which give rise to these symptoms, that is, remains of or recurrence of a benign hydatidiform mole, a malignant hydatidiform mole, and true chorion-epithelioma. Malignant hydatidiform mole may be considered clinically a form of chorion-epithelioma, as it is equally fatal, and treatment is the same.

In selecting the tissue to send to a pathologist care should be taken to remove the deep and not the superficial portions, as the active tumour tissue is found only at the advancing edge of the new growth.

Treatment. Early and immediate panhysterectomy of the widest description possible. This should be undertaken even if metastases are present, as cases are reported where cough and haemoptysis, due in all probability to pulmonary metastasis, have disappeared after hysterectomy, and metastatic tumours in other situations have disappeared after removal of the primary growth.

PART V

THE INSANITIES OF THE REPRODUCTIVE PERIOD

CHAPTER XVII

INSANITIES OF THE REPRODUCTIVE PERIOD

Causes. Reproduction is the test of a woman, and should she be in any way mentally or physically weak, she is apt to give way under the trial. Subsidiary causes are (1) drink; (2) the toxæmia of pregnancy; (3) mania is not infrequent after eclampsia; (4) acute pain (a woman may become a raving lunatic, when the child's head is on the perineum); (5) sepsis is frequently a determining cause; (6) severe hæmorrhage; (7) prolonged lactation is a severe strain to an unstable woman; (8) it is more common in unmarried women; (9) heredity.

Kinds of insanity and percentages

The insanity of pregnancy includes about 10 per cent. of the cases. The type is commonly melancholic.

The insanity of labour forms under 10 per cent. The type is acute mania.

The insanity of the first six weeks after delivery forms some 50 per cent. The type is commonly maniacal.

The insanity of the lactating period forms some 30 per cent. The type is commonly melancholic.

Symptoms

Insanity of pregnancy. In pregnancy some change of character is common. Only when it passes into definite delusion does insanity become established. The onset of the insanity of pregnancy is recognized by an exaggeration of this change of character. From the fourth or fifth month

onwards in pregnancy the patient becomes moody, irritable, or apathetic. Insomnia in the reproductive period is always of serious import; when severe it too often means the onset of insanity. The patient begins to sleep badly. Then she becomes definitely insane. She has delusions. If she vomits, she thinks she is being poisoned. She usually becomes melancholic. She sighs and groans, and nothing can shake her from her misery. She is usually constipated. She may be suicidal. She may get well before the birth of the child or not until after its birth. In other cases she does not get well at all, the insanity becomes chronic, and the woman sinks into a condition of dementia. This form of insanity is frequently due to the toxæmia of pregnancy.

Insanity of labour. Frenzy seizes the patient, as the head passes the vagina and vulva, in which she may kill the child. The attack usually passes off rapidly.

Insanity of the puerperium. This is nearly always associated with either severe anaemia from hæmorrhage or with sepsis. The patient is first irritable and uneasy about unknown dangers. She has a headache. She may refuse food. Her bowels are confined. Above all, she sleeps badly. She dislikes to see either her child or her husband. She finally becomes definitely maniacal. She may have suicidal impulses. About 80 per cent. get well.

Insanity of lactation. The patient is not in full health. She is probably a multipara, who has had frequent pregnancies and exhausting lactations. She becomes gloomy, she sleeps badly, and her bowels are confined. She becomes definitely melancholic with delusions, and may try to commit suicide. The outlook is not quite so good as that of puerperal insanity.

Prognosis. Taking all forms, the prognosis is good, for some 60 per cent. of all cases recover. If the patient gets fatter and her mind improves with her stronger physical condition, prognosis is good. If her mind does not improve with her bodily condition, prognosis is bad.

Treatment. Carefully examine the patient for any disease or other exciting cause, and treat such disease to relieve her of the additional strain. An insane woman should not

nurse nor have the management of her child. If puerperal infection is present, treat it. Four things are necessary to enable a patient to stave off or recover from an attack of insanity:—

1. Plenty of sleep.
2. Plenty of food.
3. Avoidance of constipation.
4. Plenty of exercise.

Whenever, then, a woman during the reproductive period suffers from sleeplessness, shows change of character and capricious appetite, or is constipated, overcome these defects, bearing in mind that, if this is done, any tendency to insanity is greatly decreased.

When the attack is established.

1. To give the patient plenty of sleep.

To induce sleep we rely chiefly on large doses of potassium bromide. Give potassium bromide gr. xl with chloral hydrate gr. x every two hours until the patient sleeps or until forty grains of chloral has been given. Many other hypnotics are commended, such as paraldehyde, chloral-amide, hypnol, &c., separately or in combination.

Morphia sometimes acts well, but often fails. If the patient is acutely maniacal, hyoscine (gr. $\frac{1}{50}$) given subcutaneously sometimes acts like a charm, the patient at once falling into a deep sleep with noisy breathing. Scopolamine should also be tried in these cases.

A wet pack is often most effective in inducing sleep. If the patient is an alcoholic, an enema of \mathfrak{z} ij to \mathfrak{z} iiij of whisky, following chloral and potassium bromide, may turn the balance in favour of sleep.

2. To give the patient plenty of food.

Although a patient with acute mania has a quick pulse and a dirty tongue, it is astonishing how much she will eat. Her incessant restlessness needs a large supply of food. Whether she be melancholic or maniacal, as long as she will eat, let her eat as much as she can. If she refuses food, only firmness will conquer her. Take the food and order her to eat it at once. If you cannot compel her to do so by ascendancy over her, do not go away and leave her the

victory. Pass the nasal tube, or stomach tube, at once. She may give in after this, for the procedure is disagreeable, and she may be cowed by being made to do what she did not want. If left, she may starve herself to death. As regards the amount of food, she can be given in one day as much as would suffice her for two or three days of ordinary health. Semi-fluid food, such as gruel, eggs, milk, cream, cod-liver oil, and pounded meat can be poured down a nasal tube.

Passing the nasal tube. Have some one to control the patient's head. Pass the tube wet with warm water into one or other nostril and push it back steadily and rapidly. The soft palate, irritated by the tube, contracts and pushes the end back against the posterior pharyngeal wall, and thus guides it into the oesophagus and away from the larynx.

3. To keep the bowels open.

If the bowels are very confined and the patient noisy, a drop or two of croton oil often is effective and keeps the patient quiet. Put it on the tongue directly, or mix it first with a little butter and sugar.

4. General treatment.

Much depends on the capabilities of the attendants, and those accustomed to the charge of insane patients are to be preferred. One person must always be with her to guard against any suicidal tendency, and to be ready for any outbreak of violence.

Leave as little as possible to relations, especially fussy and reproving female relatives.

The attendant sponges her night and morning with warm water.

Do not let her be strapped down. Strapping her down will madden her above all things, for she will think she is being tortured or murdered. If she struggles, the attendant should catch and direct, rather than oppose the movement. Put mattresses up against the adjacent wall, to keep her from injury during her struggles. The bedstead should be placed in the corner of the room in such a way that the patient can only get out from one side, and at this side the attendant should sit so as to prevent suicide from any sudden impulse.

If it is possible to get her up, do so, and make her walk about the room, or still better, in the garden. She will get tired and sleep better.

We treat these cases at home for a month, and if there is no improvement at the end of that time, the patient is best treated in an asylum. By this time the friends are exhausted, and not so repelled by the idea of an asylum as at first; nor is it necessary to give a gloomy prognosis, for patients frequently recover with asylum treatment. One last word of warning; pay special attention to the bladder function, for mental cases frequently suffer from over-distension of the bladder.

PART VI

THE INFANT

CHAPTER XVIII

ASPHYXIA NEONATORUM

THERE are two forms of asphyxia in children when they have just been born. They are distinguished by the colour. In one the skin is congested and purple, in the other white.

Blue asphyxia. In this form the face is purple, as if suffocated, and the body is firm and even rigid. The cord pulsates strongly. The reflexes are present. There are, of course, intermediate forms between this and 'white' asphyxia, in which the child's face is neither purple nor white, and in which the pulsations of the cord are feeble.

Treatment. Do not encourage the baby to breathe before clearing its throat of mucus. The first breath will be inspiratory, and if it sucks mucus into its lungs it will pass into the more severe condition of asphyxia pallida. Neither should the cord be cut when it is beating strongly, for the baby is getting its oxygen through the placenta.

First suck the mucus out of the child's throat with a catheter. We use Carton's catheter. Pass it over the back of the tongue and suck. Withdraw the catheter and blow out the mucus into a piece of linen. Again insert the catheter, suck, withdraw, and blow the mucus out. Continue to do this until no more mucus can be removed. If a catheter is not obtainable hold the child up by its ankles and hook the mucus out of the throat with strips of linen wrapped round the little finger.

Having cleared the throat, make the child breathe. Its

reflexes are present, and smacking it, or throwing a little cold water over it, will make it cry. Tie the cord, when the pulsations have ceased, and give the baby to the nurse.

In the intermediate cases, quickly clear the throat, cut and tie the cord, and treat as asphyxia pallida.

White asphyxia. In this asphyxia the child when born is of a deathly pallor, the limbs and body are flaccid and flabby, no reflexes are present, and either a very feeble, slow pulsation or no pulsation of the cord exists.

Treatment. Take off your gloves. Tie one ligature only round the cord for speed. Cut the cord. Hold the child upside down by the ankles and suck or wipe the mucus out of the throat. Put it in a hot bath, as hot as can be comfortably borne by the hand. Hold its head out of the bath with one hand, and rub the hot water over it with the other. Push the fingers of the other hand up under the ribs until they touch the heart. If the heart has stopped beating the child is dead. But be sure it has completely stopped before abandoning treatment. The heart is often very slow. If it has not ceased, again suck any mucus out of the throat with the catheter. Dry the child quickly on a towel the nurse has warmed by the fire, and do Schultze's artificial respiration four to six times. Again put the child in the hot bath, suck any mucus out of the throat, and feel for the heart. If there are any signs that it is coming round rub a little whisky on its gums and rub some whisky on its body. Again dry the child on a warm cloth and repeat Schultze's artificial respiration. If the skin gets pink, try the effect of a little cold water thrown over it or plunge it into a cold bath for a few seconds. If it gasps, continue the artificial respiration, hot bath and a sprinkling of cold water, until it cries. If it does not gasp, continue the hot bath, drying, and artificial respiration, as long as the heart beats or until it cries. Watch it carefully by the fire after it has cried, for fear it should relapse.

Good results have been reported from direct massage of the heart in desperate cases of white asphyxia. A small incision is made into the abdomen just below the diaphragm, through this the gloved finger is passed up to the dia-

phragm. The thumb placed above the nipple supplies the counterforce for rhythmical massage of the heart.

The infusion of one ounce of hot normal salt solution through the umbilical vein is also said to give good results.

How to do Schultze's artificial respiration. We think, when properly done, this is much the most effective mode of artificial respiration. The Sylvester method, done in the same way as to a man who has nearly been drowned, is not

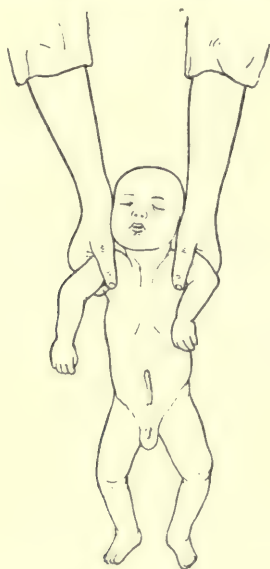


FIG. 157. Schultze's artificial respiration. Inspiratory position.

used at the Rotunda Hospital. If uncertain of Schultze's method practise it on a dummy or a stillborn baby.

The figures explain the manner of holding the child. The index fingers and thumbs encircle the axillae, the little fingers press against the occiput and steady the head, which also rests between the ulnar surfaces of your hands. The middle and third fingers pass down the child's back. Stand with legs apart, and the child's body hanging between. This is the inspiratory position. Swing a little gently to and fro for a second or two to see that you have a firm grasp, and that the child will not slip.

Then swing it boldly forwards away from you, so that it sweeps upwards, until it is about the level of your head. Then in the same movement draw in your extended arms and the child's lower limbs fall over on to its chest with its head turned downwards. This is the expiratory position. The lower limbs falling over flex the child's abdomen, which in turn presses the abdominal viscera up against the diaphragm and makes it ascend into the chest. This ascension of the diaphragm into the chest is the action of expiration; it squeezes the air and mucus out of the

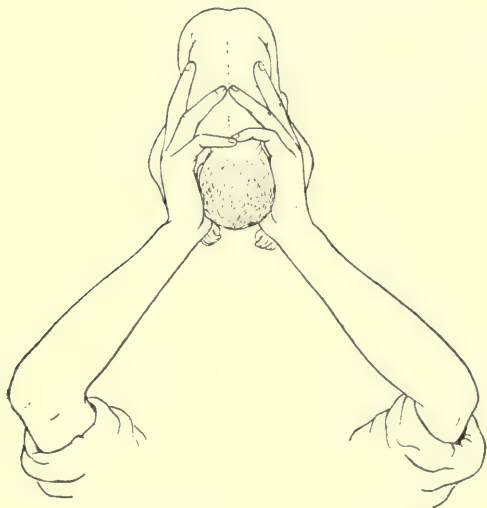


FIG. 158. Schultze's artificial respiration. Expiratory position.

chest. At the same time squeeze the ribs, doing this without in any way altering the position of your hands and fingers. Do not keep the child long in this position, for fear it should attempt to inspire. The necessary pause to prevent hurrying should be made in the inspiratory position. To swing the child into the inspiratory position, fling it outwards and a little upwards by extending the arms. We do not mean to convey violence by the word 'fling', but the secret of the correct Schultze's method is to make the baby swing by its own weight from one position to the other. A gentle push forward of the arms makes the child flop back

with a jerk which might possibly damage its spinal column. Perform Schultze's movements at the rate of twenty-five to thirty per minute.

The objections urged against this method are :

1. Meningeal haemorrhage. This is probably due to the asphyxia and not the artificial respiration.

2. Rupture of the liver. This only results from extreme violence.

3. Letting the child slip. This is due to faulty technique. The operator should be absolutely sure that his grasp is firm.

4. Fracture of various bones. If the child is held properly fractures cannot occur.

5. The cooling effect of rapid motion. This is counteracted by frequent immersions in the hot bath.

CHAPTER XIX

THE HEALTHY INFANT

General Directions for Management—Breast Feeding: its management—Spoon and Bottle Feeding—Milk Mixtures—Sterilization—Several Conditions of a Child's Welfare—Care of Premature Children.

General introduction. Before leaving a case of midwifery, examine the child to see if it is physically defective. Look into the mouth and see if there is cleft palate, examine the limbs, see that the anus is perforate, and if in doubt push a thermometer up into the bowel.

Having found the child normal, leave a few instructions about attention to it, and direct its progress day by day. Upon skill in the management of infants much of your reputation with the mother will depend. She is not capable of appreciating the true value of aseptic technique, but she is a shrewd judge of the welfare of her child.

We make therefore a few general remarks on the care of infants, for the interpretation of their condition has to be made by a different process from that of the condition of adults' health. From slight and transitory signs, you will often have to gather sufficient knowledge to direct treatment. Not only are physical signs in infants often transitory and difficult to interpret, but infants are exceedingly fickle in health. They may quickly change from normal health to serious illness and often as quickly recover from apparently hopeless conditions. Therefore, be guarded in prognosis, and expect to meet with unforeseen disappointments and successes that refuse to obey the laws of previous experience. The history that the nurse or mother supplies is frequently distorted by a desire to hear a favourable report. Therefore put leading questions concerning the food the child has, its frequency and amount, whether it

suffers from flatulence, sweating, constipation, diarrhoea, &c., with a thoroughness that should not be modified by the apparently simple and direct nature of the case.

Pay great deference to the fears expressed by the mother or the nurse, even if the child looks well. They are constantly watching it, and have every opportunity of noticing the finer changes in its face and manner, which are particularly significant indices of its health.

Make a thorough physical examination of a child that is said not to be well. Ask the nurse or mother to undress it. The mother may say that the child has just gone to sleep or the day is cold, but tell her its health is more important. Be gentle when examining, and don't frighten it. Have warm fingers and keen eyes. Finish the examination by light percussion, for percussion is apt to make a baby cry.

It becomes essential to know first what is a healthy child and how it should be tended. We will deal with the unhealthy child in the last chapter.

The healthy infant

The great majority of children are born healthy. Even the children of women dying from phthisis, heart disease, or starvation are frequently healthy in contrast to the perilously diseased condition of the mother. The natural law of the care for the race and indifference for the individual is borne out by the healthy condition of the baby at the expense of the dying mother. Any one, who sees a large number of the new-born children of the poor, must be impressed by their capacity for health. They are firm, fat, and chubby. Nature gives them a good start. Their danger comes when they have to struggle with the disadvantages of civilization.

A healthy child is plump, does not vomit, takes the breast or its bottle readily, is not flatulent, has the bowels opened three to four times in the twenty-four hours for the first six months, and does not cry frequently nor long, certainly not more than half an hour continuously. Its temperature after the first three days should not be over 100°, when taken in the rectum. The pulse is variable. The faeces are soft, and yellow, never green, nor have they white curds. The

skin is without spots, and the tongue is clean without even one patch of white.

A healthy baby increases in weight about seven ounces a week, for the first two or three months, with the exception of the first week. Breast-fed children illustrate this rule with greatest uniformity. In bottle-fed children the growth is more uncertain.

The forehead should not be damp with sweat when it is in its cot or perambulator. Sweating usually means that it is too heavily clothed.

Finally, the condition of the anterior fontanelle is an excellent guide. It is normally level with the bones. In ill health it is sunk. More rarely in meningitis, and it is said before convulsions, it bulges.

When called in to decide whether a baby is healthy or not, take all these things into account. If there is any departure from the normal, look carefully for any irregularity or unsuitability in management.

General directions for the management of a healthy child.

We think the first three days of life exceed all others in importance. It is then that interference with the wishes of nature are frequent, and these, we believe, are always to the child's detriment.

Urine. The urine should be passed within the first twelve hours. Always inquire if this has been done. If apparently it has not, it frequently means that the nurse has let the napkin dry. Do not be alarmed so long as there is no spherical tumour (the bladder) above the pubes. Wash with wet cotton-wool the orifice of the urethra to free it of any smegma, give the baby a teaspoonful of cold water and put it in a hot bath. Put your hand over the orifice of the urethra and you will feel the stream of urine if any is passed. Even without this precaution there is no cause for anxiety if there is not a full bladder above the pubes. Direct the nurse to put hot flannels on the hypogastrium and carefully watch the napkins for the next six hours. If at the end of that time she is sure that the baby has passed no water, pass a sterile No. 1 silver catheter. This passes quite readily in either sex.

Meconium. The bowels should be opened about six times in the first twenty-four hours, voiding dark green meconium. If within twelve hours no meconium has passed, put your little finger, well lubricated, up the anus. If there is no imperforate anus, when the finger is withdrawn meconium nearly always follows. If there is an imperforate anus the obstruction may be felt. The operation for imperforate anus is given on p. 451. Meconium continues to come away for three to four days, after which the motions become pale yellow.

Condition of the child after birth. When the child is born, no organ of its body springs into action at once, and yet there is a profound physiological change. The lungs supply oxygen, but even though a baby has cried lustily, full inflation has sometimes been found to be absent when the body has been examined in cases of infanticide. The new paths of the circulating blood take time to become completely established. There must be a heat-regulating centre, which, like the circulation, is prepared for the new conditions, but does not probably at once start into full working order. Above all, the digestive organs need a little time to develop efficiently their new functions.

Importance of the above. Crying is the most efficient means of inflating the lungs, so if a baby does not cry well during the first twelve hours it should be made to do so. This is more important with weakly children, who have not given a lusty cry.

With regard to the heat-regulating centre, although there is no need to wrap the child up at once after birth, the room must be warm. It does the child good to kick about on the bed. Its bath, too, must not be under 100° F.

The abuse of the digestive organs is a common offence. Too frequently, after birth, a little castor oil, some butter and sugar, milk and water, or the top of gruel is given to the child. We strongly disapprove of these practices. Nature has arranged that the welfare of the healthy child of a healthy mother can be best promoted by adhering to her own directions. The milk does not enter the breast until the third day of the puerperium. A little colostrum is

secreted, and we believe its purpose is to accustom the baby's stomach and digestive organs to the function of digestion. It is probable that colostrum contains antigens or some similar substances which are capable of exciting the tissues to secrete the antibodies necessary for the assimilation of food. It is therefore most desirable that a new-born child should be supplied with colostrum. Whether the colostrum has or has not a laxative action seems to us unproven.

We have already mentioned that, if the cord is not tied until pulsation has ceased, some three ounces of blood pass into the infant, which otherwise would be lost. The body contains more blood at birth than it does at the end of three days. The child must consume this before the establishment of the flow of milk. *We insist that neither medicine nor food, except colostrum, should be given until the time when the maternal milk supplies its needs.*

Early flow of milk. In some cases the milk is abundant on the second day. This is too soon, and the child is apt to take too much and so get indigestion. Put it to the breast sparingly to prevent this.

Late flow of milk. In other cases the milk does not appear until the fourth or fifth days. The baby gets hungry and cries. Give the milk mixture described on p. 422, after putting it to suck what it can from the breast. The milk frequently becomes very scanty at the end of a week. Many mothers discontinue nursing on this account, which is a great mistake. If plenty of fluid is taken the milk returns in twenty-four or thirty-six hours, as a rule, and the enforced fast is beneficial.

Breast feeding.

Times of feeding. Put the child to the breast within six hours after its birth if the mother is awake. Twice in the first twenty-four hours, three times during the day and once during the night for the second twenty-four hours, suffices. Give it teaspoonfuls of water if it cries from thirst. From the third day onwards let it take the breast every two hours during the day and once during the night. Thus it is fed at 8 a.m., 10 a.m., 12, 2, 4, 6, 8, 10 p.m., and 3 a.m., counting from the beginning and not

the end of each meal. Insist above all on regularity. Wake it up if it is asleep at the appointed time. Sometimes it is difficult to wake, or if sleepy it refuses to take the breast. If so, let it sleep until the next appointed hour has arrived. The discipline of regularity in meals is good for children, as for adults, and lays the foundation of good health and temper.

A child has a tendency to sleep by day and be wakeful at night. This tendency can be counteracted to the advantage of the parents by feeding once only during the night. Once give way to crying and allow it to be fed at night, there will be little peace. In plain words, we think it necessary to gain the upper hand and not be bullied by irregular clamouring for food. The child, if dealt with in the manner we advocate, soon falls into the paths of discipline, and gains thereby the advantages of a well-ordered mode of existence. Its digestive juices are secreted with periodical constancy, and this periodicity is not upset by the offer of the breast whenever some capricious fancy causes the child to cry. The function of digestion also has timed periods of rest, the importance of which has been shown by the fact that, if a man of regular habit takes a meal at an unwonted hour, it will frequently remain unattacked by the digestive juices until the customary meal hour arrives.

Upon digestion depends health, upon discipline stability of character, and we do not think these foundation-stones of a useful life can be laid too early.

Method of breast feeding. When the mother is in bed, she turns on the side of the breast which is to be used, and gives the nipple, which has just been washed with a piece of cotton-wool and warm water. She must be careful not to jam the child's nose against the breast, so that it cannot breathe freely, whilst sucking. Sometimes, when the mother and nurse report that the baby is too weak to suck, this is the true reason, and it can be detected by watching the nursing. Put the child to one breast only for a feed. The other breast is used for the next feed. If only one breast can be used it is better to give the

bottle alternately, for the milk that is secreted by the breast every two hours is generally too thin and poor in quality. *Twins* should have one breast each. If they do not flourish, one of them must be weaned.

How much shall be given? Our rule is—and it applies to both breast and artificial feeding—let the child have as much as it will take without possetting. If its stomach is too full the extra quantity will be posseted. When it possets, give it less next meal. Judge of the amount swallowed by the duration of the meal. If it feeds for twenty minutes and possets, feed for fifteen minutes the next time, and so on until the longest time without possetting is found.

Care of the nipples. Let the nipples be washed after suckling with boric lotion, and then dabbed with a little weak spirit (eau de cologne or brandy and water equal parts) to prevent maceration of the epithelium. Before feeding the nipples are washed with warm water.

The nipples may be depressed, yet it is astonishing how a baby will draw them out. Speaking accurately, the action of a baby's mouth is rather to press back the tissues away from the nipple than to draw it out. This action the mother can also aid by pulling back the tissues around the nipple with her fingers or pressing them back with an umbrella ring. If the baby cannot get the nipple, let it try daily, and let the nurse draw the nipple gently out with clean fingers several times a day. Use a nipple shield, as when the nipples are cracked (p. 397). In artificial feeding the force is suction which causes a negative pressure in the mouth and tends to depress the nose and cause a highly arched palate.

Attention to the nursing mother. Nursing women tend to eat too much. This is especially harmful during the lying-in period. They are encouraged to over-eat, and this brings on indigestion. Tell the nurse to regulate the time and quantity of each meal. Keep the patient's bowels regular by giving plenty of fluid, fruit, and green vegetables, and, if necessary, by cascara, senna, or other non-irritating laxative. We know the popular objection

to fruits and green vegetables, but we have never found any bad results from their use.

If the milk begins to run short give the mother more fluid. There is a popular fallacy that milk given to the mother comes out as milk in her breast. This leads to the mother drinking milk between her meals, which takes away her appetite and causes indigestion. Again, there is a popular notion that stout and beer given to the mother produce more milk in her breast. This is probably right, for by drinking stout or beer she gets more fluid. Water is equally serviceable, the essential part being the ingestion of fluid.

Nervous shocks, too many visitors, and the unwise statements of nurses, all discourage a woman from efficient nursing. She is told that she will not be able to nurse, that she is too delicate, or that her child is too strong. The nurse not infrequently says that the baby is cross and flatulent, or that it is having too little milk. Do not give way to these suggestions, but urge the regular breast feeding, and be very chary of any change. Finally, a nervous woman may find nursing very painful. Point out to her the great advantage breast feeding is to her child. Even a week at the breast is a great advantage.

Times of feeding in later months. After the end of the first month let the baby be fed every three hours during the day and once during the night. From the sixth month to the time of weaning it should have three-hourly feeds, and sleep throughout the night. In some cases it is better to feed every three and a half hours, for if this is not done free hydrochloric acid will not be found in the stomach. This free acid acts as a natural antiseptic and prepares the stomach for the next meal.

Drugs excreted in mother's milk. Purges given to the mother sometimes make the child cross. We think cascara sagrada has the least effect on the child. Belladonna, opium, and a prolonged course of bromides or iodides should be avoided in nursing women.

Women who cannot nurse.

1. Women who have some general disease such as phthisis or heart disease.

2. Women who have no milk. Very rarely women have no milk; more commonly deficient milk is due to keeping the baby from the breast and avoiding the stimulus of suckling.

3. Women with sepsis.

4. Women with interstitial mastitis.

5. Women who are insane.

6. Women who have lost a considerable quantity of blood during labour.

7. Women whose health is genuinely injured by lactation.

8. Women who have to go out and work for their livings.

A syphilitic woman can nurse her own infant safely. Finally, some women refuse to nurse their children for personal reasons. Urge upon them that their breast milk belongs to the child, and emphasize the risks of artificial feeding.

How to stop the flow of milk. A tight binder round the chest, put on after labour, will prevent the onset of the milk in practically all cases. In private we put on the breast lint spread with cere ointment (yellow wax 1, olive oil 8, warmed before spreading) and then a binder. Many use belladonna liniment in place of the cere ointment. Give also a concentrated saline purge. Should the breasts swell and be tender, use the breast-pump sparingly, withdrawing but a drachm of milk. This will relieve the pain, and seldom has to be repeated. Acetate of potash, twenty grains three times a day, is also recommended. It is stated that under this treatment the engorgement of the breasts rapidly subsides. We have not employed it because it seems to have no advantage over the treatment outlined above.

The frequent and prolonged use of the breast-pump or massage is wrong in theory and harmful in practice. Potassium iodide in 20-grain doses is often used.

Children that must be spoon fed.

1. Children with unoperated cleft palate or bad hare-lip.

2. Children with syphilitic and painful ulceration round the mouth.

Wet nurses. It is hard to get a respectable woman as a wet nurse. Sometimes, if the infant cannot be got to pro-

gress by any other way, wet nursing may rear it, but such cases are rare, and the milk of the wet nurse in many cases does not suit. The essentials of a wet nurse are that she should be free from all suspicion of disease, especially syphilis, that her breasts should be healthy, that her teeth should be sound, that she should be of respectable and orderly habits, and that her own child should be much the same age as the child to be suckled, and should be healthy.

Artificial feeding. Cow's milk is the most convenient and best food for infants after human milk. Ass's milk is said to be better, but we have had no experience of its use.

Differences between cow's and human milk. Recent researches have shown marked differences between human and cow's milk.

Cow's milk contains two to three times as much proteid as human milk. This proteid occurs in two forms, casein and soluble proteid (lactalbumin, &c.).

Casein is a phosphorus containing proteid combined with lime. It is not coagulated by heat, but is thrown down in the form of curd by acid or rennin.

The soluble proteids are the most readily digested of all forms of albumin. They are present in relatively greater amounts in human than in cow's milk.

Sugar occurs as lactose in both, but in human milk it is two to three times more abundant than in cow's milk.

The amount of fat is about the same, but human milk contains a greater proportion of fat with a low melting point and therefore greater digestibility.

Lecithin, a constituent of nerve structures, is greater in amount in human than in cow's milk.

Human milk contains citric acid and cow's milk does not. Human milk is also alkaline or faintly acid in reaction and quite sterile.

Cow's milk is acid in reaction from the bacteria it contains, which may amount to 200,000,000 per c.c. Even when obtained by the most up-to-date aseptic methods a limit of 12,000 bacteria per c.c. is permitted.

But above and beyond these chemical distinctions, there are more subtle differences to be noted. Newly-born

animals are poorly supplied with complement and antitoxins to enable them to repel germ invasion or to assimilate food.

It is now suggested that tissue cells can assimilate nourishment only through the intermediate agency of special antibodies. The early milk of a cow is rich in antigens, substances capable of exciting the formation of antibodies in the calf. In calves fed from later milk these antibodies are not found.

Again, it is almost impossible to rear guinea pigs weaned from the first, but if they suckle the mother for three days ninety per cent. can be reared after weaning.

Experience in infant feeding points strongly to similar conclusions, namely, that the colostrum and early milk have the power of exciting a beneficial reaction in the infant's tissues.

How to alter cow's milk to make it like human milk. It is now easy to work out a method of altering cow's milk to make it resemble human milk.

1. The proteid, or curd, is two to three times as much in cow's as in human milk.

2. The fat in cow's milk and human milk are in about the same proportion.

3. Human milk contains two to three times more sugar than cow's milk.

4. The curd of cow's milk is in larger and harder masses than that of human milk. Barley-water mechanically divides up the curd of cow's milk. Citrate of soda, gr. j to every ounce of milk, or the use of lime-water in place of barley-water, makes the curd more flocculent.

5. The cow's milk is acid from bacteria, while human milk is alkaline or only slightly acid. The less cow's milk is allowed to stand and the fresher it is, the less acid it will be. It is best kept in covered earthenware jars in a cool place. Sodium bicarbonate, although it makes the milk less acid, is not a natural constituent of milk. Lime-water makes the curd more flocculent and diminishes the acidity.

6. The bacteria are destroyed as far as possible by some form of Pasteurization or sterilization.

The mixture. We have found the following mixture the most convenient and easy to make up:—

Milk	1½ ounces.
Cream (15 per cent.)	1 ounce.
Lime-water	½ ounce.
Solution of sugar of milk	1½ ounces.
Citrate of soda	3 grains.

How to give the mixture. Do not give this undiluted mixture until the third day. During the first twenty-four hours give the baby the mixture with three parts of water for three feeds. During the next twenty-four hours give the same for six feeds. This dilute mixture is intended to take the place, roughly, of the colostrum. On the third day use the above mixture as an exact substitute for breast feeding as regards time and amount. We think children up to one month old do as well, if not better, on this mixture than on any other method of artificial feeding. The milk mixture is always Pasteurized before use. The quantity required will be between one and three ounces for each meal.

Its constituents. Barley-water may be substituted for lime-water. *Barley-water* is made by adding two teaspoonfuls of well washed pearl barley to a pint of water. Boil to three-quarters of a pint and strain. It must be freshly made morning and evening.

Lime-water is a saturated solution, and is made by shaking up unslaked lime with water in a clean bottle. Let this stand, and pour off the supernatant, clear fluid. It is better to make lime-water than to buy it.

Milk sugar can be bought from chemists. The solution is made by putting three ounces of milk sugar into a pint of hot water. Keep it in a corked bottle after Pasteurizing for ten minutes. Dark Demerara sugar does almost as well, but has twice the sweetening power and is more liable to ferment and cause flatulence.

Cream that has been centrifugalized at the dairy contains between 40 and 45 per cent. of fat. If the centrifugalized cream cannot be obtained, set aside some good fresh milk for about six hours and skim off the cream. This will contain about 15 per cent. fat.

When the child is a month old. From this time on we believe that undiluted cow's milk is the best food. If we can get the baby nursed for one month we consider it a great advantage, for the digestion is much more stable at the end of one month. We then give undiluted cow's milk to which a little sugar is added, giving water between meals to allay thirst. We do not believe the digestion is as delicate as it is commonly supposed to be. If water is added, not only is the milk diluted but the gastric juice is diluted also. We certainly get better results with whole milk than with diluted milk. It also has the advantage of simplicity. Before using, the milk should be sterilized for forty minutes in Soxhlet's sterilizer.

Feeding with pure cow's milk. This gives the right amount of fats, and the sugar added makes up the right amount of carbo-hydrates. Only the casein is in excess. This excess is passed per rectum. The stools are large, and often whitish from unused curd, which matters nothing so long as the baby is well. There is rarely constipation. The milk and the milk mixture given throughout the first month are always Pasteurized before use. Boiling impairs its nutritive qualities, whereas Pasteurization hardly does so. Pasteurization does not render the milk completely germ free. It does not kill spores, and in some instances babies have died of acute choleraic diarrhoea, although only fed with carefully Pasteurized milk. These cases are very rare, and the better nutritive qualities of this milk, as opposed to those of boiled milk, warrant the risk of such rare disaster. By Pasteurization most organisms, among them the tubercle bacillus, the typhoid bacillus, the bacillus coli, are killed. We add citrate of soda to the whole milk in the proportion of one grain to the ounce as in the mixture up to three grains.

Water and times of feeding with pure milk. Pure milk, as we have stated, is deficient in fluid, therefore the baby wants water between meals, and is given it with a teaspoon. Pure milk is also a more concentrated food, and feeds need not be so frequent. Every three hours is sufficient, and after the third month four-hourly feeds suffice.

Method of Pasteurization. The apparatus used at the Rotunda is the Soxhlet milk sterilizer.¹ It consists of a cruet-stand which holds ten bottles and fits into a saucepan. The milk or mixture is poured into the bottles, one feed in each, which will mean between $2\frac{1}{2}$ and 5 ounces the first six months, and between 5 and 10 ounces the second six months. Cover the mouth of each bottle with the little rubber cap. Pour water into the saucepan until the bottles are three-quarters immersed. Then raise the water to boiling-point. The milk does not itself boil. It only attains to a temperature of 160° to 170° F. at the end of ten minutes. The mixture is kept in the boiling water for ten minutes, for a longer exposure diminishes its

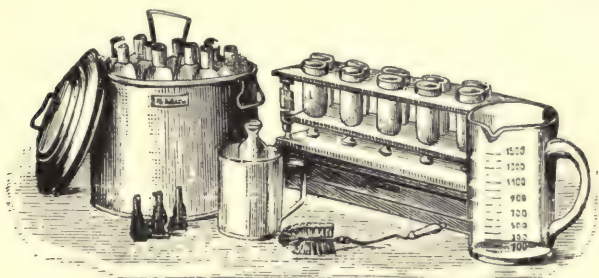


FIG. 159. Soxhlet's milk sterilizer.

nutritive qualities by raising its temperature nearer to the boiling-point. For the first three months whole milk is kept in the boiling water for forty minutes, thus being sterilized, that is, raised to the boiling-point. A quarter of an hour suffices after the third month. It is best to prepare the milk morning and evening. The rubber cap, which gets sucked a little into the mouth of the bottle as the latter cools, keeps the air from the contents. Cool the milk rapidly by plunging the bottles into cold water. Bottles are apt to crack if very hot and plunged immediately into cold water. Keep them in a cool place.

Giving the bottle. When the child is to be fed, the

¹ Strauss's apparatus for Pasteurization is also very convenient. Directions for use are given with it.

nurse takes one bottle, warms the milk in it by putting the bottle in warm water, removes the cap, and with clean fingers fits on a rubber teat. These rubber teats she scrubs inside and out, boils preferably before each feed, but at least once a day, and keeps in soda solution. The child is fed straight from the bottle. There is, of course, no air vent, but it manages its feed successfully, letting go of the teat occasionally to let air enter. If it seems to have difficulty, see whether the hole in the teat is large enough. Feeding by the bottle takes a long time, sometimes up to half an hour, but this is not a disadvantage. It must always be fed, never allowed to suck the bottle in its cot, sleep, wake and suck again.

After the sixth month. The first teeth appear about the sixth month. We then thicken the milk with a little infant food, preferably Mellin's, Benger's, or Frame food. Put a teaspoonful in a saucepan with some milk and boil for five minutes. Add the thickened compound to the bottle contents. From the eighth to the tenth month we wean the baby from the breast or bottle.

Food for poor children. The mothers of poor children are unable to make the mixture we advocate, or to buy a Soxhlet's sterilizer. Give them a bottle of citrate of soda, and they can buy some Demerara sugar.

After the second day, then, such children have as artificial diet:—

Milk	.	.	.	$\bar{3} 1\frac{1}{2}$
Barley-water	.			$\bar{3} \text{ ii j}$
Demerara sugar	.			One smoothed teaspoonful
Citrate of soda	.			A pinch.

They can put the mixture in an ordinary bottle and put the bottle into a saucepan of cold water. Then boil the water in the saucepan for ten minutes. If this cannot be managed they can put the feed in a small saucepan, heat until the milk rises (170°), and then let it cool rapidly by putting the saucepan in cold water. The mixture should be kept in a clean corked bottle put to stand in cold water.

Keeping the bottles and nipples clean. This is an important part of infant feeding. The remnants of milk about the

nipple or in the bottle form food for bacteria, which are ingested and may cause gastro-intestinal infection.

The bottles are rinsed in cold water, scalded inside and out before and after feeds, and kept in a solution of soda when not in use. The bottle must never have any rubber tubing. It is better to keep two in use, and they should be boiled at least once a day.

The nipples are scrubbed before and after each feed with soap and water, inside and out, boiled at least once a day, and kept in soda solution.

Position of the baby whilst feeding. Let the nurse always hold the baby on her arm. As we have said, it must not have the bottle in its cot.

Mixed feeding. If a baby does not gain weight on breast feeding alone, we sometimes give the bottle with a little Mellin's or Benger's food once a day, and also for the night feed.

Weaning. Wean the child about the eighth or tenth month and feed it with a spoon. If breast-fed, and if it is stationary in weight, wean before this. Begin with one spoon feed of whole milk once a day. If the child keeps well give it alternate breast and spoon feeds. Sometimes it is convenient to give the bottle instead of spoon feeds, and it is then weaned from the bottle at twelve months, weaning thus taking two to three months.

Do not wean a breast-fed baby in hot weather, when diarrhoea is prevalent, but wait until the period of summer diarrhoea has passed.

There is no need to stop nursing because the menses start.

General conditions of an infant's welfare

Fresh air. Fresh air is very important to health. We advise that it should be taken out into the fresh air after the first day, unless rain is falling or the air is damp or very cold. The sooner, too, it is put in a perambulator the better. It will get more fresh air in a perambulator, for it is less tedious for a nurse to wheel a perambulator than to carry the baby, and consequently she will stay out longer. It is good, we think, to keep

it out in the sun all day, except at meal times. If the child is well wrapped up it will not catch cold. It should lie on its back, for this is the natural position.

The nursery windows should be open night and day, winter and summer. They may be closed whilst bathing, although we know from experience that children do not catch cold if the window is open.

The bath. To avoid wetting the cord, it is advisable only to give a shallow bath until it has separated. It is not submerged in a shallow bath. Soap, after the first bath, should not be used with a very young child. Rubbing with a towel is too severe for the delicate skin. It should be dabbed with a warmed towel to dry it. After this the groins, buttocks, and armpits are dusted with some powder such as boracic acid 1 part, zinc oxide 3 parts, starch 6 parts. Fuller's earth may possibly contain tetanus bacilli, and is therefore not advised.

When the cord has separated, which it does between the fifth and tenth day, the baby has a bath morning and evening. The temperature of the water should be 90° F. The nurse should never immerse the head, but hold it with her left hand.

Care of the eyes and mouth. In a healthy child the eyes should be sponged with cotton-wool wipes and warm water night and morning. The mouth should be cleansed three times a day with soft linen or cotton-wool and warm water. The nurse wraps the linen or cotton-wool over her little finger and so wipes out the mouth.

Care of the cord. The cord is dressed daily. It is first dusted with the powder given above. A piece of scorched gamgee tissue or scorched linen is then cut half-way down the centre, or a hole through which the cord can pass is cut in it. The tissue is drawn round the cord and folded over it with its scorched surface to the cord. It is kept in its place by the binder. By keeping the cord dry separation is best effected. Sometimes a small weeping surface is left. Treat this with boracic powder.

Care of the prepuce in a male child. The prepuce should be pulled back a little day by day by the nurse, and the

surface of the glans sponged. In a few days the nurse will be able to completely retract the prepuce. From that time, whenever the baby is bathed, the prepuce should be drawn back and the glans cleansed.

Sleeping. We advise that an infant should always be kept, when indoors, in a separate cot, except at meal times. If it is nursed to sleep in the mother's bed, it will get accustomed to this soporific form of nursing, and cry and be wakeful without it. Above all, do not let curious visitors be constantly handling the baby and spoiling its sleep. Let it be put back to the cot immediately after a feed. Jiggling after meals is very harmful. The room should not be specially warmed and a child treated like a hothouse plant. The ordinary temperatures that suit adults suit children just as well. A child should sleep with its face exposed to the air and not covered by a blanket, or thick veil, when in its perambulator.

Clothing. The principal fault in children's clothing is that it is too thick. When the clothing is too thick the child perspires. The forehead is moist and the child is often fretful. Nor should the clothing impede the movements. It must not be tight round its chest or abdomen. Exercise is important to progress, therefore it must be able to kick freely and move its arms.

Crying. A healthy child does not always cry because it is hungry. It may be thirsty. Giving it two or three teaspoonfuls of cold water will quickly decide the point. If this does not stop its crying, it may be too hot or its feet may be cold; its napkin may be wet or soiled; a pin may be running into it; a flea may have bitten it, or it may be fretful from too much attention, when it wishes to sleep. A change of position in the cot will often stop the crying. If it continues to cry, remember that crying is one of the chief signs that a child is not well.

General information about the normal child

At 6 weeks a baby begins to observe and hear. If it turns at a sound, it is not deaf and will not be dumb.

At 3 months it holds up its head.

At 6-8 months the two lower central incisor teeth appear. The four upper incisors next appear between the ninth and twelfth months.

At 8 months it should be trained to go without napkins. They should at first be removed for several hours and then replaced. It will get accustomed to regular habits in this way.

At 12 months the child begins to walk.

At 12-18 months it begins to talk.

Care of premature children. Premature children are apt to do well for a week or so and then die suddenly. We think the principal reason is want of fluid. They require to be kept warm in Gamgee tissue, or in an incubator to imitate the heat of the uterus. They perspire and so lose fluid, as well as by passing urine and faeces. The stomach is very small, and they may take nearly an hour to swallow a teaspoonful of fluid. Hence our rule is to give water by enemas, as well as fluid by the mouth. Our hospital routine is—

First day. Water by mouth and colostrum. One or two teaspoonfuls of peptonized whey. Three to four enemas of $\bar{3}$ ss. of normal saline. In giving these enemas, hold the baby up by the heels and introduce the fluid very slowly.

Second day. Four meals of peptonized whey and colostrum. Enemas as before.

Third day. Peptonized whey, unless milk is established. If the child is too weak to suck, draw off the milk with a breast-pump and give it by a teaspoon or by a small glass pipette. Enemas as before.

From the fourth day. Give three enemas of $\bar{3}$ ss. daily, until the baby is taking enough fluid. The milk flow should by now be established. If not, give the milk mixture, but dilute it at first with equal parts of water.

CHAPTER XX

THE UNHEALTHY INFANT

Symptoms and Methods of Examination—Ill Health and Alteration of Food Mixtures—Diarrhoea, and Green Stools—Vomiting and other Early Complaints—Later Complaints—Infantile Convulsions—Ophthalmia Neonatorum—Intussusception.

WE have in the last chapter described the healthy child and dealt with its management. We have now to deal with the unhealthy child. Frequently the signs of illness are so obvious, when called in consultation, that you immediately set to work to discover what is wrong. But at other times the signs are so indefinite, that they may hardly awaken suspicions. The mother, eager to do the best for her child, brings it to see you at fixed periods in order to assure herself that its progress is satisfactory.

How to judge of the progress of a child by weight. A healthy child increases in weight about seven ounces a week for the first three months of its life. This increase is best exhibited in breast feeding. The progress of the increase in weight is often irregular, but in three weeks there should be an increase of fifteen to twenty ounces. If not, suspicions of ill health are aroused. If seven pounds at birth it should average twelve to thirteen pounds in weight at three months, eighteen to twenty pounds at six months, and about two stone at twelve months.

How often should a child be weighed? Once a week for the first three months of its life and less frequently later. But remember to weigh it with the same amount of clothes and at the same time of day, and not one week before, and another week after a meal.

Gain in weight with bottle-feeding. Frequently there is

very little gain in weight for the first month. Provided the child shows some increase in weight you can be satisfied with the care it is getting.

Significance of the weight. As has been said, the weight is the best test of progress. If some of the characteristics of a healthy child are absent, if, for example, it cries frequently or seems to have colic or is constipated, and yet week by week it gains in weight, there is no cause for anxiety about the nature of the food it is getting, although attention should be paid to the quantity of the food and the régime of careful upbringing.

It is, indeed, a cardinal rule of infant feeding not to change the nature of the food, unless there is definite evidence that it is losing or not gaining weight. Every change in diet involves the risk of a few days' digestive disturbance, whilst the child is getting accustomed to the new food. If it is not gaining weight, it must be classed as unhealthy, and most probably will have other signs of ill health.

Examination of unhealthy children. When a physical examination is necessary the nurse should undress the child completely before a fire. It is difficult enough in many cases to find exactly what is wrong, but it is made still more difficult if the clothes are only opened or pulled up to permit of partial examination.

With warm hands, feel the limbs, and look for signs of syphilis such as tenderness of the epiphysial lines, pemphigus on the palms and soles, &c. Phimosis will sometimes make a baby cry for long periods after urinating, and also predisposes to hernia and rickets. Notice the child's buttocks and see if they are red. *Red buttocks* are a common accompaniment of diarrhoea. Examine the *groins* to see that the skin is soft and not excoriated, also the *inside of the thighs*, which may be excoriated by napkins which are too bulky, or allowed to remain on when wet. Then examine the *abdomen*. It is prominent in a baby. So too with the *chest*. Notice whether its conformation is regular, whether the breathing is very rapid, if there is any sucking in of the lower ribs with inspiration, and in older children any signs of beaded ribs, the 'rickety rosary'. Listen over

the *lungs* with a stethoscope, and examine the *heart*. Inspect the hands and the palms for pemphigus. Then pass on to examine the head, and above all feel the *anterior fontanelle*, whether it is flush with the bone as in health, or sunk as in ill health, or bulged as in meningitis. The sinking in of the anterior fontanelle is *a most reliable sign* of ill health in an infant. Feel the forehead to see if it is moist. Moisture of the forehead means that the child is too hot or that it is rickety. Take the temperature by pressing the thermometer into the groin and keeping the thigh flexed. Notice if there is any sign of snuffles or cold in the head. Percussion should follow, and remember that absolute dullness will not be obtained even if the pleural cavity is full of fluid. Only a relative diminution of resonance will be found. Examine the mouth. Look for tongue-tie, and for cleft palate. See if there is any thrush, and lastly press down the tongue with your little finger or with the handle of a teaspoon to see the throat. This will make the child cry, and should be left until the last.

Importance of examination. We insist that a systematic examination of the child will save blunders. As an example of the danger of omitting a physical examination may be mentioned the case of a baby that wasted. Various changes of diet and different medicines were tried without avail. Eventually the child was stripped and a large abdominal sarcoma was found. Or, to give a more homely illustration, we remember being called to stop a long screaming fit, and on undressing the child we found that the binder had been sewn through the skin.

Further investigation. Turn your attention to the *condition of the napkins*, which should be kept for examination. The nature of the *stools* is of great importance. In health they are soft and light yellow. In ill health they may be green, contain curds, undigested fat, slime, mucus, and sometimes blood; or on the other hand they may be hard and dry.

Notice whether the *urine stains the napkin*. If it does it means that the child is not getting enough water.

Next pay attention to the *food*. If breast-fed, look for

sore nipples in the mother and inquire as to the care and cleansing of the breasts, the number and times of the feeds, and notice how she suckles. If bottle-fed, ask how often it is fed, and how the food is prepared. Look at the bottles and the teats. Ask how the milk is prepared and how the bottles are kept clean.

Then inquire into the general hygiene, the appetite, clothing, sleep, fresh air, and how often the bowels move.

Ask whether the child cries much, and, as we advised in the introductory remarks, pay careful attention to the fears and opinions expressed by the mother and nurse who are constantly watching it.

Value of the knowledge gained. You should now have gained some sound notion as to the cause of ill health. In the majority of cases there is some mismanagement. Ill health in a child of healthy parentage is almost certainly due to some error of management, more rarely to some congenital or acquired disease. If an error of management is discovered lay down precise rules for future guidance; it is essential that a young obstetrician should have these at his command nowadays, for many mothers study the question of baby-management in small handbooks and can easily expose his ignorance.

REASONS FOR ILL HEALTH, AND TREATMENT

A. **Reasons connected with the feeding.**

1. The food may be too strong.
2. It may be too weak.
3. It may be unsuitably given.
4. The child may not be able to suck properly.
5. It may not get enough fluid.
6. The food may be unsuitable.
7. Accompanying these may be colic, vomiting, diarrhoea, or constipation.

B. **Other reasons.**

8. The child may be kept too hot, in stuffy rooms, and not allowed to have sufficient fresh air and exercise.
9. It may have some general disease.

1. **When the food is too strong.** A child may fail to increase in weight because its food is too strong. It will often vomit after each meal, vomiting the contents of its stomach, and not merely possetting the extra quantity it does not require. It will also probably have constipation or diarrhoea with colic, as evidenced by screaming, drawing up its legs and hardening its abdomen.

The stools give the most definite signs. Evidence will be obtained that the food is too strong to be properly digested, for undigested curd and fat will be found. Either there are separate masses, or else these coalesce so as to make a stool that is somewhat white in colour. These signs occur almost exclusively in bottle-fed infants, and must be watched for with especial care when bottle-feeding is started.

We must here repeat that when an infant is fed on whole milk, whitish stools are not infrequent. Yet it thrives and puts on weight. Therefore this cannot be considered abnormal.

What to do. Dilute the milk mixture. Substitute lime-water for barley-water, for lime-water is more likely to aid digestion by diminishing the amount of curd formed. Try, too, feeding every two and a half to three hours instead of every two hours. By this means the muscular coat of the stomach is rested, and the mucous membrane is cleansed with free hydrochloric acid.

If these measures fail and the child is still in ill health, the food is unsuitable. Give the diluted milk a fair trial of three days to a week. There is not always immediate improvement with a diet that may eventually prove suitable.

2. **The food may be too weak.** This is a less likely reason than the above for ill health in bottle-fed children. Breast-fed children may find the mother's milk too weak.

There is not a proper gain in weight. The child cries and whines with hunger. When the food is finished, it does not fall contentedly to sleep, but may continue to whine, and is wakeful. It will be constipated. Frequently the signs of insufficient fluid are present, namely, a urine that stains the napkin, and hard, dry stools.

What to do. If feeding with the milk mixture, add another teaspoonful of sugar and cream to the six ounces. It is most unlikely that this will prove too weak, but if it does, decrease the quantity of barley- or lime-water. Be sure first that the baby is sucking properly and getting large enough and long enough meals.

If on milk and barley-water, give it cod-liver oil, ten drops three times a day, and decrease the amount of barley-water.

In both cases give water between meals.

If breast-fed, we would advise an occasional bottle as a substitute for one or more breast feeds. The breast has then longer to fill and the milk becomes more plentiful and stronger. Pay attention also to the health and diet of the mother. Mixed feeding is often very successful.

3. The food may be unsuitably given. *Irregularity* in the times of feeding is an exceedingly common, perhaps the commonest, cause of interference with a baby's proper progress. Some mothers put the infant to the breast whenever it cries. The food stops the crying for a time. Later it cries again, and is again fed. Again, it may not be put to rest after its meals, but is taken to see some friends or relatives and as likely as not is jigged up and down by them.

We have already insisted on the importance of cleanliness in the method of feeding. It is a point which one cannot impress upon the nurse or mother too emphatically.

Lastly, the food may be given too fast. Greedy children often posset the milk after a meal.

What to do. Insist upon regularity of meals and upon rest after meals. Put the child to rest either in its cot or perambulator.

Always see that the mother or nurse pays strict attention to cleanliness in the giving of food.

If the child is very greedy and gulps down its food as fast as it can, tell the mother to squeeze the nipple a little, to prevent a too rapid flow of milk. In both breast-fed and bottle-fed children the speed of a meal can easily be

regulated by taking the baby from the breast or bottle and making it rest for a minute or two.

4. The child may not be able to suck properly. Causes:— (1) depressed nipples, (2) the jamming of the nose against the breast, (3) bad hare-lip, (4) cleft palate, (5) tongue-tie, (6) prematurity, (7) too small a hole in the rubber teat.

True tongue-tie is very uncommon, but does occur. It is easily cured by nicking the fraenum with scissors, which is without danger to the lingual artery. The scissors should be blunt-pointed and kept close to the floor of the mouth. Haemorrhage can always be stopped by pressure with cotton-wool. The attendant should not leave until all bleeding has stopped.

Hare-lip and cleft palate. Some surgeons advise operation in the first month of infant life for both these defects, so as to avoid the inefficient nutrition that results from the awkward process of spoon feeding.

5. There may not be enough fluid given. If there is constipation, with dry, hard stools, and the urine stains the napkin, the child is not getting enough fluid. It cries with thirst, and its crying is stopped if water is given to it.

What to do. Give as many teaspoonfuls of boiled water between meals as it will take. This is especially necessary when feeding with whole milk.

6. The food may be unsuitable. If there is little or no increase in weight in spite of the fact that careful attention has been paid to the cleanliness, amount, and regularity of meals, the food is unsuitable and should be changed.

What to do. These cases have to be treated on much the same principles as malnutrition or dyspepsia in an adult, that is to say, attempt to find out what is unsuitable in the diet, and endeavour to find one that is suitable. Again we think it is a mistake to regard babies in too general a light. They, like adults, have their individual likes and dislikes. The aphorism that what is one man's food is another man's poison can be applied to babies. For example, you are perpetually warned in textbooks of the danger of giving starch to infants under three months old, and are given as a reason

that an infant possesses no amylolytic ferments. Yet we have been guilty many times of disregarding the dogmas of physiology and have added to the diet of ill-nourished children of under a month old, Mellin's, Benger's, or Frame food, and they have done very well. Even should they fail to digest unconverted starch, we do not see that any great evil need necessarily result, for they can pass the extra food in the stools, just as many adults do daily, who over-eat themselves. We are not, however, advocating any indiscriminate use of patent foods, but are protesting that experience shows that a greater licence can often be permitted to the digestion than is nowadays allowed to it by the rigid laws of chemical analysis and physiological experiments.

We are now dealing with a child which is not progressing, which has perhaps some signs of digestive disturbance, but these signs are not urgent enough to call for immediate and radical treatment. In short, we are dealing with one with which we are not satisfied, but about which we are not really anxious.

Constituents of the diet over which we have control. We have control over the diluent, the fat, the sugar, and the casein.

The diluent. If diluting the milk it is possible that the diluent itself is at fault. If children fed on barley-water are permitted to become constipated, they will certainly suffer from colic and flatulent dyspepsia due to fermentation of food.

Lime-water may be used if any signs of gastritis, such as vomiting, arise. Lime-water is antacid and is a sedative to the stomach. It also interferes with the formation of rennin curd, which is, therefore, diminished in amount and rendered easier of digestion. In place of lime-water plain water may be used with a grain of sodium bicarbonate as an antacid to each ounce of food. This does not interfere with the amount of curd formed, but by combining with the excess of hydrochloric acid, makes the milk clot more digestible. Rice-water is serviceable when there is any tendency to looseness of the bowels, oatmeal-water

when there is constipation. Oatmeal-water is made in the same way as barley-water. Rice-water is made by boiling a teaspoonful of rice in a pint of water for ten minutes and straining. Finally, plain water is often the best diluent of all.

The fat. Too much or too little fat may be given.

Too much fat. This is indicated by loss of appetite and slimy stools containing whitish smears of undigested fat. Cream from cow's milk does not always agree with infants, probably because it contains less fat of low melting temperature than human milk. In such a case give less fat (it may often be wise to decrease the sugar as well). It is easy to decrease the amount of fat in the milk mixture by discontinuing the cream. If this is not sufficient, it is quite easy to reduce the fat further, either by using a separator or by letting fresh milk stand in a cool place and skimming off the cream. The amount of fat as cream that can be skimmed off depends on the number of hours the milk is allowed to stand. Roughly, if it stands for two hours, the milk in the upper half of the jug will contain twice as much fat as that in the lower half. The curd produced by clotting entangles most of the fat, so that whey contains much less fat than milk. Whey, in fact, contains 0.5 per cent. of fat at the most, whereas cow's milk contains 3.5 to 4.5 per cent. If, then, the baby seems to lose its appetite, is sick or regurgitates its food between meals, and has slimy, sometimes very offensive stools, reduce the fat, by stopping the addition of cream, then by separating the cream from the milk by a separator, and lastly, if the signs of indigestion continue, by resorting to whey. Pancreatic emulsion is sometimes tolerated better than cream.

Too little fat may be the reason why a child does not flourish. If there is little or no increase in weight and there are no signs of indigestion, it is likely that an increase of fat will prove beneficial. Therefore, add cream to its diet, or cod-liver oil. Begin with half a teaspoonful of cream or five drops of cod-liver oil to each meal. Even a breast-fed baby may be the better for ten drops of cod-liver oil three times a day after a meal.

Sugar. There may be too much or too little sugar in the diet.

Too much sugar gives rise, like too much fat, to signs of indigestion. Vomiting may be constant. Flatulence, with or without colic, is another sign, and flatulence is especially apt to occur with constipation. The sugar is shut back in the bowel and fermentation takes place. Cane sugar is more liable to fermentation than milk sugar, but food rarely ferments if constipation is avoided. To overcome these symptoms reduce the amount of sugar or stop adding it to the mixture. As a note, it may be mentioned here that Nestlé's milk, with which we deal later, upsets children sometimes because of the excess of cane sugar.

Too little sugar is sometimes a cause of non-progress. Add a little extra sugar tentatively to the food if the child, though otherwise well, is not gaining in weight as it should.

Casein. Casein is converted by rennin into calcium paracasein. This is a soft flocculent curd which, in the absence of hydrochloric acid, is passed into the intestines and is there digested.

Acid is not found in the infant stomach until the third day.

Calcium paracasein is changed into free paracasein by the action of either hydrochloric or lactic acid. This is a tougher curd, and requires pepsin and stomach peristalsis for its digestion. Excess of either of these acids causes continued change with the formation of a very tough, indigestible curd, paracasein hydrochloride or lactate.

Hydrochloric acid combines readily with casein, and is not found free in the stomach until towards the end of digestion. Then it probably acts as a disinfectant and prepares the stomach for a new meal. Therefore it is easy to understand the harm done by giving fresh food before the previous meal has been digested. Casein is the constituent of cow's milk that is the most troublesome for the digestion. We have seen how we at first diluted the milk because of the casein, and how we added lime-water or barley-water and citrate of soda to make the curd more like the curd of human milk; in fact, the modifications of cow's milk are really modifications directed to

make the casein more digestible. Yet in spite of all these modifications, the indigestibility of the curd of cow's milk is still the great obstacle to success in the artificial feeding of infants.

We have already dealt with the question of too little casein under the heading of the food being too weak. Fear of the indigestibility of casein has led some doctors to dilute the milk to such an extent that there remains very little nourishment in the weak milk. We, on the other hand, start with the same percentage of casein as is in human milk. At a month old, we go one step further and give undiluted milk. We have found this bolder policy much better than treating the child as if it were an invalid from the time of birth, and could not be expected to digest anything stronger than milk diluted with three or four times its bulk of water. In fact, we believe this timid policy defeats its own end by weakening the power of the gastric and intestinal juices as much as the milk they have to digest. Still, although the stronger foods certainly seem to be advisable, there are children which fail to digest casein properly and suffer in health from this disability.

Casein indigestion is shown chiefly by colic, and curds in the whitish bulky stools. When the child has colic it screams with sudden pain, draws its legs up and hardens its abdomen. Vomiting is more often due to failure to digest fat or sugar. Colic is not uncommon in children, and when accompanied by progressive increase in weight is not of serious importance. But when there is colic, with curds in the stools, and perhaps diarrhoea and unsatisfactory progress, the quantity of casein given to the bottle-fed child must be modified. If we are not sure as to which of the food ingredients is the cause of indigestion, we are more likely to get good results by first altering the casein.

To alter the casein. The simplest way is to increase the amount of diluent.

There are five other means of altering the casein—

- (a) By some form of whey and milk mixture.
- (b) By giving condensed milk.
- (c) By giving peptonized milk.

(d) By the use of patent foods.

(e) By the use of citrate of soda.

(a) **Whey mixtures, or milk and whey mixtures.** Whey contains less than 1 per cent. of proteid, and therefore this is a very efficient method of decreasing the casein. The amount of fat is also reduced to about one-fourth, but the sugar and salts, being in solution, are not altered.

To make whey add one and a half teaspoonsful of extract of rennet to a pint of fresh milk. Stand in a warm place until it curdles firmly. Break up the curd with a fork and strain through coarse muslin. The whey takes the place of the milk in the mixture. Thus whey mixture has the following constituents:—

Whey	1½ ounces.
Gravity cream (15 per cent.)	1 ounce.
Lime-water	½ ounce.
Solution of sugar of milk	1½ ounces.
Citrate of soda	3 grains. ¹

This mixture is the same as the milk mixture, except that it has one-half to one-third as much proteid. Manage with it as with the milk mixture, and if there are signs of too much fat or sugar, decrease them in the same manner as in the milk mixture. As the child improves gradually substitute milk for whey.

(b) **Condensed milk.** Mothers of poor children cannot make whey mixtures properly, and they should be advised to give condensed milk instead. Nestlé's milk is the one commonly used, because it is the easiest to get. Start with one *full* teaspoonful of Nestlé's to ten of water. There is no need for barley- or lime-water. The casein of condensed milk is more rapidly digested, but the fat is deficient. Therefore add five drops of cod-liver oil to each meal, or give ten to twenty drops three times a day after meals.

(c) **Peptonized milk.** Where whey mixtures fail, peptonized milk will sometimes succeed in nourishing a child, but we prefer to try whey mixtures thoroughly first. Peptonize milk by means of Fairchild's powders. Take half

¹ Soluble albumen in the form of Albulactin is a useful addition to all varieties of artificial foods.

a pint of milk, add five grains of sodium bicarbonate to it and a Fairchild's powder. Stir them, and keep the mixture for twenty minutes at a temperature of 110° F. Then raise quickly to boiling-point to stop the action of the ferment, and cool. Dilute with one, two, or three parts of water, and add a little cream and sugar, tentatively at first, because an infant that must be fed on peptonized milk has little healthy digestive power. Gradually, as it improves, decrease the time the powder is allowed to act, and increase the amount of fat and sugar, until the mixture returns to the composition of the milk mixture, or some other mixture with fresh milk that suits. Pepsencia is a simple, more palatable, and probably a more efficient pepsin than the above.

(d) The use of patent foods and citrate of soda.

Patent foods. It is difficult to lay down any rules for patent foods, but when there is no increase in weight the addition of some infant food to the bottle will often cause improvement. Many patent foods can be added to milk, or when the casein is badly digested they can be made up with whey, or can be made with water only. The directions are given on the packages.

Some children who are unable to digest ordinary milk thrive on Allenbury No. 1. This is a dried milk, and is prepared for use by the addition of water. This food often becomes musty in the tins, and unless it has a pleasant biscuit-like smell it should not be used. Mellin's, a malted food almost free from starch, with whey as a diluent, makes a good food in some cases, when milk is not tolerated as a diluent. Savory and Moore's, and Benger's foods we have also found of real use in quite young infants who were going progressively backwards or were stationary on other foods. The use of any of these foods should be a temporary expedient, and they are not to be preferred to a milk diet.

We use Frame food by preference, as an addition to the milk of children over six months. A child at this age has been drinking pure milk. We blend a teaspoonful of the food in some milk and boil for five minutes. We then add

the rest of the milk for the meal, and in this way the pure milk is not diluted with water.

Citrate of soda. We think it is a good thing to add citrate of soda to all foods in the proportion of one grain to the ounce. This produces a soft curd which is more easily digested. Soluble salts of calcium are necessary to enable rennet to cause coagulation of milk. It has been suggested that sodium citrate combines with these calcium salts and limits or stops the ferment action, according to the dose.

Summary of changes of diet for a child that does not progress in weight. Find out whether the food is too strong or too weak, whether it is suitably and cleanly given; whether the child is able to suck properly and has enough fluid, and treat it accordingly. Then pay attention to the diluent. If the food upsets the digestion, find out whether fat, sugar, or casein is at fault. If alteration of the constituents of milk mixtures together with dilution does not enable it to digest properly, resort to whey mixtures, or in place of whey mixtures, for a child of poor parents, use the condensed milk. If whey mixtures fail, try dilute peptonized milk. If still dissatisfied, try either the addition of some patent food to dilute milk or whey; or in bad cases try a patent food such as Benger's or Allenbury No. 1 alone, for a time. Give grey powder in these cases. Always carefully examine the baby and discover the other conditions of its life, and finally remember that a baby takes a little time to get accustomed to a change of diet, and therefore do not hastily abandon a new diet because it does not show signs of immediate improvement. Very rarely a child will not thrive with any of these methods. A wet nurse should then be procured if possible. It is very probable that human milk contains some substances which are capable of increasing the complement in the infant's blood, and so enables the antibodies to combine with the food.

7. Colic, vomiting, diarrhoea, constipation. These conditions are nearly always due to errors of diet, and the nature and correction of these errors have already been discussed.

Colic. Treatment. The general dietetic treatment has been given. To stop the pain, put hot flannels on the abdomen. See that the child is warm, for cold feet and too light bed clothing may cause colic. A good treatment for colic is sodium bicarbonate gr. ij, added to half a grain of grey powder, night and morning. If the colic persists, give the child a dose of castor-oil, limit the amount of food it is having, and give it teaspoonfuls of hot water between meals. Dill water and five drops of sweet spirits of nitre are useful household remedies.

Vomiting. Treatment. Lessening the amount of food, or decreasing the fat or sugar, often stops vomiting. Lime-water and sodium bicarbonate are useful as gastric sedatives.

Vomiting, which does not stop with other treatment, can often be relieved by washing out the stomach. Do it in the same manner as described on p. 158, using a No. 10 soft catheter as a stomach tube, and about an ounce of water for every month of the child's age up to six months.

Diarrhoea.

Looseness of the bowels can usually be stopped by decreasing the amount of food for a few meals and giving a dose of castor-oil. Then endeavour to discover the ingredient at fault and lessen or remove it.

Infective enteritis or green stools. Diarrhoea of a more definite nature nearly always results in *green stools*, and frequently the buttocks are excoriated and red. Vomiting may accompany the diarrhoea. It is because of the association of these two—red buttocks and green stools—that you should always look at the napkins of the child and examine the buttocks. Thrush also often accompanies the diarrhoea.

Treatment. Treatment is first directed to the cause, and this will frequently be found to be cracked nipples in a breast-fed baby, or a dirty bottle in a bottle-fed baby. Treat the cracked nipple or insist on greater care in the preparation of the food, as the case may be.

First give a teaspoonful of castor-oil. If the child vomits, wait for two hours and give another teaspoonful. Ten to

twenty drops of syrup of rhubarb can be given instead of castor-oil. In more severe cases, wash out the bowel with a soft No. 10 catheter and two or three ounces of water. *Washing out the bowel and stomach is the essential treatment of food poisoning.* Do not hold the funnel more than $1\frac{1}{2}$ to 2 feet above the baby. The intestines are cleansed of their decomposing or irritating contents in this way (see p. 453, Infantile Convulsions). Keep it from the breast for twenty-four to forty-eight hours, and give it hot water or albumen water (white of two eggs to the pint of cold water). If bottle-fed, give it no cow's milk for two or three days. Hot water and albumen water suffice. Beef juice (made by taking a pound of raw beef, mincing it, soaking it in one pint of cold water, and straining the product through muslin) contains the soluble albumen of meat and is therefore nutritive. The real difficulty in treatment comes when milk has to be given again. The digestive organs have been upset, and proper treatment consists of a judicious balance between resting the digestive organs and using them for nutrition.

In breast-feeding, begin by short feeds at four-hourly intervals, and then at two-hourly intervals, giving plenty of water between meals. Give abundant fresh air and sunlight.

In bottle-feeding, begin after twenty-four or forty-eight hours with pepsin whey, gradually adding sugar and fat, or give dilute peptonized milk. These cases are suitable ones for feeding temporarily with a patent food.

The best drug with which to control any diarrhoea that persists after disappearance of the green colour is bismuth. Give the salicylate of bismuth in five-grain doses with four grains of aromatic powder of chalk, three times a day to a child of six months. Give a fourth of the above doses to a child of a month, and a half to one of three months.

The **red buttocks** are treated by strict cleanliness, removal of the napkins as soon as soiled, and washing the buttocks with cold water. Paint them with picric acid in methylated spirit (saturated solution) once a day, to harden the

epithelium. Zinc ointment, thickly spread, keeps the excoriated surfaces from becoming wetted.

Apthous stomatitis, or thrush. Thrush is a disease of the mouth that results from a dirty nipple or bottle, or the much treasured, but frequently filthy, comforter, the use of which we strongly condemn. The tongue and cheeks are covered with white patches, which cannot be wiped off. The mouth is dry. Thrush is due to a mould, and can be cured by cleansing the mouth after meals with soft linen and water, and three times a day giving a saltspoonful of glycerine and borax.

Constipation. Treatment. Constipation is common in breast-fed children, and is undesirable. It is less common in bottle-feeding, and is then most frequently due to too little fluid, or to the food being too weak. Sometimes giving teaspoonfuls of hot water will suffice to cure the constipation, and we also give ten drops of cod-liver oil three times a day to children fed on the breast.

In children of three months the addition of a little Mellin's food to the diet is often effectual.

If a medicine is needed, give either (1) an occasional soap and water enema of two to three ounces injected with a small glass syringe, or (2) ten minims each of syrup of senna and syrup of figs, with ten minims of glycerine and water to the drachm, three or four times a day. Extract of malt with cascara sagrada, half a teaspoonful three times a day, is also very valuable.

Get the nurse to massage the baby's abdomen. To do this she lubricates her hand with sweet oil and rubs slowly round and round the abdomen in the direction of the passage of the faeces through the colon. When this is done night and morning, much good often results. Temporary constipation can be overcome by inserting into the rectum a small piece of soap moulded into the shape of a suppository and wetted before using.

8. The child may be kept too hot, in stuffy rooms, and not allowed enough fresh air and exercise. We have already dealt with these points, and only repeat them here to emphasize their importance.

9. General diseases.

Marasmus. There are babies that lose weight and sometimes even die in spite of various foods and treatments tried. The assimilation may be primarily at fault, due to faulty glandular innervation or to an absence of complement in the serum, which would render the food antibodies inert.

A physician with moderate experience will certainly encounter many cases of marasmus. In nearly every instance the infant is born healthy and remains so for several days or weeks. The illness usually begins with colic and gastric disturbance.

In such cases pyloric obstruction is to be feared. This obstruction is seldom organic, but is usually due to hypertrophy and spasm of the pyloric sphincter, with resultant dilatation of the stomach. Stomach lavage (washing out) and gavage (tube feeding) are the mainstays in treatment. These cases require patience and careful nursing for several weeks. Salt baths, massage, and change of air are all factors in treatment.

As a last resource gastro-enterostomy may be performed with a fair prospect of success.

Congenital syphilis may cause marasmus. In these cases anti-syphilitic treatment is indicated.

Congenital syphilis. Congenital syphilis may show itself at or shortly after birth. Such children are wizened and have the 'old man' aspect. Eruptions break out on the body, the most typical being the bullous eruption, which appears especially on the soles and feet, and is known as syphilitic pemphigus. They usually die within a week or two of birth.

More frequently the child is in excellent health until it is a month old. Snuffles, a macular rash which tends to become the well-known raw ham colour, the syphilitic psoriasis of the soles and palms, fissures around the mouth, acute inflammation, with extreme tenderness of the epiphyses of the long-bones, and malformation of the nails, are the principal signs of syphilis in the early months of childhood.

Foetal circulation and congenital heart disease. In the

foetus with functionless lungs the circulation is materially different from that of the breathing baby.

The blood from the left ventricle is pumped into the aorta, from which it proceeds to the head and neck, body and limbs. A strong stream of blood passes along the two hypogastric arteries, which spring from the internal iliacs into the umbilical cord. The umbilical arteries furnish the placenta with foetal venous blood. The blood, oxygenated, returns by the umbilical vein, which, after entering the abdomen, divides into two branches, one of which joins the portal vein, whilst the larger enters the inferior vena cava by the ductus venosus. The blood of the inferior vena cava discharges into the right auricle, and most of it then passes into the left auricle by means of the foramen ovale. From the left auricle it goes into the left ventricle. The blood in the superior vena cava, returning from the head and neck passes into the right auricle. Some of the blood in the right auricle passes into the right ventricle. By the contraction of the right ventricle this blood is forced, some into the lungs through the pulmonary arteries, but most passes by the ductus arteriosus into the aorta, joining the stream from the left ventricle.

The practical importance of understanding the foetal circulation is that the foramen ovale and ductus arteriosus, which should close soon after birth, sometimes remain patent. When they do, the result is a form of congenital heart disease. The child is feeble, blue and cold. It is liable to convulsions and attacks of vomiting. Loud systolic bruits are often heard. The management consists in wrapping the child up in cotton-wool and guarding it with especial care, but the results are disappointing, as children with congenital heart disease are always ailing, and rarely live to maturity.

Congenital stenosis of the pylorus. This is to be remembered when dealing with a baby that frequently vomits.

Rickets and scurvy. These diseases may show themselves in children of six months or under, either as the result of bad feeding or the result of chronic gastro-enteritis.

The above diseases are those most likely to affect the pro-

gress of the child, by an interference with its health, not so sudden in itself as immediately to call your attention to the disease.

Anaemia. Anaemia is common in city children, and is often overlooked as a cause of ill-health. It is readily cured by syrup. ferri phos. co. m x to xx three times a day.

BIRTH INJURIES

Depressed fracture of the skull and facial paralysis. These have been described under injuries from forceps, p. 332.

Fractures and Dislocations. Fractures of the limbs or clavicles sometimes occur as the result of difficult births. The arm may be broken when bringing it down in a difficult breech delivery, the leg in an impacted breech. In treating these fractures the fracture should be reduced and the arm bandaged to the chest and the forearm immobilized by flexing it and enclosing it in the chest bandage. The thigh and leg should be flexed up along the body and bandaged there in treating fractures of the thigh. In treating dislocations, immobilize the joints. The bandages should be removed early and careful massage and passive motion carried out.

Brachial paralysis. Paralysis of the arm is a rare sequel to a difficult labour. Unlike facial paralysis, it frequently remains permanent. On account of this difference Küstner carefully investigated these cases, and came to the conclusion that there had always been some fracture or dislocation of the humerus at the same time. Those cases of birth palsy known as 'Erb's Paralysis', characterized by wasting of the deltoid and pectoral muscles and brachio-radialis, belong to a different category. Here the lesion would appear to be rupture of the fifth cervical cord; the symptoms of pronation of the forearm with inability to raise the arm are sufficiently characteristic, and in these cases the treatment of permanent paralysis ought to be surgical, freeing the nerves, and if necessary reuniting them.

Cephal-haematoma. A cephal-haematoma is an effusion of blood beneath the periosteum of the skull, which appears on the second or third day. It does not therefore extend beyond

a suture. In this way a cephal-haematoma can be diagnosed from a caput succedaneum, the swelling of which is not limited by sutures. From a meningocele it is differentiated by the time of its appearance, as well as its situation, the latter being over a gap in the bones which is readily felt, also by the fact that a meningocele connected with the cavity of the cranium becomes tense when the child cries. Nothing need be done, for the blood is absorbed after some time.

Haematoma of the sterno-mastoid. This is by no means a rare sequel. Many think torticollis may follow a haematoma of the sterno-mastoid.

Cerebral haemorrhage. Cerebral haemorrhage may result from a difficult labour. This is, more commonly than is generally supposed, a cause of sudden death occurring soon after birth. Its symptoms depend on the amount of blood poured out. Convulsions may be followed by death. Some of the cortex may be destroyed, causing various birth palsies.

CONGENITAL MALFORMATIONS

With **tongue-tie, cleft palate, and hare-lip** we have already dealt under Interference with the baby's power of sucking.

Meningocele, encephalocele, spina bifida. The immediate treatment of these conditions is to cover them with cotton-wool in order to keep them from friction or injury. For further treatment ask the opinion of an operating surgeon.

Club-foot. The proper treatment of club-foot is immediate movement. Six to eight times a day the feet should be pulled into the right position by the nurse, beginning from the time of birth. Further treatment is given in works on surgery.

Phimosis. Phimosis is treated by dilating the foreskin with sinus forceps and separating the adhesions between the glans and prepuce. If it does not fully retract within ten days, the question of circumcision must be considered. When performed within the first three weeks this is a very simple operation and requires neither the administration of an anaesthetic nor the insertion of sutures.

Umbilical or inguinal hernia. These herniae may be

aggravated by straining due to phimosis, in which case circumcision is advisable.

An umbilical protrusion may usually be cured by folding the skin over the protrusion by means of a strip of plaster or strapping, or keeping a penny or the cork of a pickle bottle over the hernia by strapping.

In some instances the child is born with a large hernial protrusion, in which the intestines can be seen in a thin sac. This sac gives way in a few hours, so that an immediate operation must be undertaken. In the course of the operation we have found the sac so intimately connected with the bowel, that it was safer to leave parts of it than risk tearing the bowel trying to peel it off entirely. We have also experienced great difficulty in returning the hernia. Therefore, we insert all the sutures, leaving them untied, and then push back the intestines and tie the sutures one by one. The treatment of inguinal hernia belongs to general surgery.

Imperforate anus. If there is only a thin partition this can be divided.

When there is no proper anus the operation consists in making a vertical incision with a knife in the middle line where the anus should be. If the bowel is not exposed, the incision must be deepened, cutting as close to the sacrum as possible to avoid the bladder. When the bowel is seen bulging down, open it carefully by puncture. Do not pull the bowel down, but pass the little finger or a bougie daily to prevent the incision closing. Be very careful to stop all haemorrhage after this operation. Infants are apt to die from quite a small loss of blood.

Naevus. Children are not infrequently born with small naevi, and as they grow larger it is well to remove them early. This can be done either by excision with a sharp knife or electrolysis.

DISEASES THAT APPEAR SHORTLY AFTER THE BIRTH OF THE CHILD

Congenital syphilis and thrush. These have been described.

Mastitis. The breast of both male and female sometimes secrete after birth. If let alone this will cease

spontaneously. If interfered with by the nurse an abscess may form.

Treatment. Protect the breast with pads of wool. If an abscess forms, open it in the usual way.

Gum or strophulus. Gum consists of little red pimples crowned by a vesicle or yellow crust, which appear when a baby is too hot or has indigestion. For example, they may be seen on a baby's cheek that has been resting against the breast of the mother.

Treatment. Keep the child cooler and use a dusting powder. Attend to its digestion.

Jaundice. Slight jaundice is common about the third day of infant life. Treatment is not necessary, but two or three grains of phosphate of soda may be given three times a day, and frequent teaspoons of warm water.

More severe and deeper jaundice is due to some congenital or acquired disease of the liver or stenosis of the bile duct, and ends fatally.

Jaundice may also be a feature of umbilical sepsis, when it is of quite secondary importance.

Sepsis of the umbilical cord. In spite of every care in dressing, the umbilical cord may become infected by pyogenic organisms, but the greater the care the less is the risk.

Two conditions may result. The first is a phlegmonous inflammation of the abdominal wall about the umbilicus, the second is a general septicaemia. Frequently the two occur together. All the signs common to septicaemia occur. Thus the baby is exceedingly ill, petechiae and jaundice appear, the cord may begin to bleed, the pulse is very rapid, and death supervenes.

Treatment. In the general septicaemic form nothing can be done. When there is a local phlegmonous inflammation, it should be treated like cellulitis elsewhere, by incisions and fomentations. Remove the child from the mother, for the virulent germs that are killing it may give the mother some form of puerperal infection.

Haemorrhage from the cord. Haemorrhage from the cord, unless due to looseness of the first ligature, is a very

serious sign. The haemorrhage is either due to sepsis, or haemophilia, and in either case will probably lead to a fatal result. Subcutaneous haemorrhages and melaena may accompany it.

Treatment. Put another ligature on the cord closer to the umbilicus. This usually fails to stop the haemorrhage. The next method is to underpin the umbilical vessels. Pick up the umbilicus and pass two long needles under it from side to side. Now wind a piece of woollen thread boiled in solution of corrosive sublimate in a figure of eight about the needle and so compress the umbilical vessels. Guard the points of the needles with pieces of cork. We have several times stopped bleeding successfully by this plan.

Melaena. The baby may swallow blood at the time of delivery or suck it from a cracked nipple and pass it per rectum. More frequently it vomits such swallowed blood. Duodenal ulcer and intussusception have been found in babies a few days old. True melaena is due to a haemophilic condition and is serious. It is sometimes associated with subcutaneous haemorrhage and bleeding from the cord, and is frequently fatal.

Treatment. First examine for cracked nipples.

In the dangerous cases give little or no food until the bleeding has stopped. Give water by the mouth. Calcium lactate gr. iij, with adrenalin chloride one minim every four hours, will prove effectual in many cases. If it seems successful, continue it three times a day until there has been no bleeding for a week.

INFANTILE CONVULSIONS

Causes. The nerve centres in infancy and childhood are always in a comparatively unstable condition, and are apt to manifest this instability by convulsive storms. Thus the processes of early dentition, or the onset of the acute infective fevers, such as scarlatina and measles, may be associated with convulsions.

Very young children may develop convulsions as the result of brain lesions inflicted at the time of birth; or they may arise from lesions of which the origin is obscure. Hereditary

sypilis, too, may occasion them, and it is probable that true epilepsy develops at an early period of infancy.

To make an accurate diagnosis of the cause is often a matter of extreme difficulty, and many of the diseases associated with convulsions do not fall within the province of the obstetrician.

A much more common cause of convulsions than any of the above will be found in the digestive disturbances of infancy, and to these we desire to call special attention.

Few children brought up by the bottle fail to develop green stools during some portion of the period of bottle feeding. These green stools are not infrequently connected with convulsions. They occur with diarrhoea, which is sometimes very severe, but are occasionally seen with constipation. They arise, too, as a result of gastric disturbance, or of thrush. This green pigmentation is due to germ invasion, and the stools in which it is found are apt to be very toxic.

We have frequently noted that the occurrence of convulsions has followed misdirected efforts to arrest green diarrhoea. They have also seemed to us to follow excessive abstraction of fluids from the infant's body, in cases where severe vomiting and diarrhoea coexist.

Given a child in convulsions, who at the same time has been suffering for some days from green stools, vomiting, and diarrhoea, with red buttocks and evidence of thrush, with a depressed fontanelle, pale sunken cheeks and eyes, the probability that convulsions have arisen from these associated conditions will be strong, and treatment which does not take this morbid state into consideration will be of no avail.

Treatment. The above diseases have already been fully dealt with, but we would again emphasize the point that castor-oil in full doses should be at once administered.

Float a drachm and a half of castor-oil on the top of a wineglassful of hot water. From the water it is readily skimmed, and can be easily administered.

All other available methods to effect elimination of toxins should be adopted; these will include enemas of soap and

water, or plain salt and water. From one to two ounces of fluid may with safety be injected into an infant's rectum, a larger quantity is unnecessary and has been known to cause rupture of the bowel. If there is any suspicion that the stomach contains indigestible matter it should be promptly washed out with saline solution, and through the tube used for this purpose the oil can be conveniently poured. If the child's system requires fluid this can be given by the mouth, per rectum, or by subcutaneous saline injections. We have employed all three methods with satisfactory results.

Whilst these remedies are being prepared the child should be placed in a hot bath to which a teaspoonful of mustard has been added. A handkerchief wrung out in cold water and laid on the head whilst the child is still in the hot bath is a mode of treatment which some have found efficacious.

We have anaesthetized the child with chloroform as a temporary expedient, but cannot say that we have ever observed benefit to result from the treatment, and confess ourselves prejudiced against it.

Where a rapid amelioration of symptoms seems urgently called for, give morphia. One minim of liq. morphinae may be given every half-hour for three doses if symptoms continue, or better still half this dose may be given hypodermically and repeated every half-hour whilst necessary. The following is a good sedative mixture, which can be administered when the acutest symptoms have subsided:

Sodium bromide	.	.	.	gr. 24.
Chloral hydrate	.	.	.	gr. 12.
Tinct. belladonae	.	.	.	℥ 12.
Glycerine	.	.	.	3 ss.
Water	.	.	.	ad 3 l ss. Ft. Mis.

Such a mixture may be given in drachm doses every hour whilst the child is awake and the convulsions continue, and from two to three times a day so long as it shows from twitching muscles that there is still a tendency towards convulsions.

Do not lose sight of the child until normal digestion has been established.

OPHTHALMIA NEONATORUM

Infection. The eyes of infants and very young children are apt to become infected and develop acute conjunctivitis. The infection is frequently (but not invariably) due to gonorrhoea, the germs of which become inoculated during the child's progress through the parturient canal. When infection thus arises, the disease develops on the second or third day after birth.

Danger. An increased knowledge amongst doctors and nurses has happily rendered the disease rare, but it still remains the one affection of all others that swells the ranks of the class of unfortunate beings who are commonly stated to have been 'born blind', or who have been 'blind from birth'. It must also be noted that destruction or injury of the eye may follow treatment carried out on the most approved principles, and the obstetrician should never hesitate when possible to resign the case to the care of a skilled ophthalmologist, who may be depended upon to have at his command a resourcefulness and skill in the treatment of such cases beyond that of the obstetrician. It frequently happens, however, that such skilled help is not available, and for those who find themselves in this position our remarks are applicable.

The prognosis is usually good, if treatment is begun early and thoroughly executed.

Course and symptoms. It is not uncommon to see the disease starting in one eye, but quite the exception to find it remain localized for many days; as a rule both eyes are soon involved.

The conjunctiva becomes red and injected and soon pours out pus. Owing to the swelling of the lids and the spasm of the orbicularis the pus is pent up in the eye. When the eyelids are opened the pus wells out. Sometimes so great is the tension that the pus squirts out. Later, ulcer of the cornea may occur, with the result that the eye is entirely destroyed. Permanent haziness of the cornea may result.

Since November, 1903, 11,364 women have been delivered

at full term in the Rotunda Hospital and eighteen children have developed ophthalmia. To this number must be added one, which we personally know to have developed the disease after the mother's discharge from the hospital on the eighth day; we have met with other cases where ophthalmia has apparently resulted from a late infection. It is easy to understand how contaminated wipes, rags, towels, or marine sponges could serve as a medium for the conveyance of infection.

Prophylaxis. We find it impossible to doubt that the small number of cases seen has been entirely owing to the fact that Credé's prophylactic treatment, i. e. the dropping of a 1 per cent. silver nitrate solution into the eyes of the infant immediately after birth, has been adopted by us as a routine measure. Where this prophylactic has seemed to fail we believe it to be due to the fact that the solution has never reached the eye. More than once we have noticed nervous probationer nurses failing to get the infant's eyelids properly open while performing this operation, and we suggest the following as a ready method of ensuring success.

Place the infant on the nurse's lap with face looking towards the ceiling, pour a little pool of the solution into the hollow between nose and eye, then whilst this pool is in situ let the lower and upper eyelids be pulled apart by the thumbs of the nurse. The inexperienced have expressed fears lest the eye be injured by an excess of the silver solution, but such fears may be dismissed as groundless.

Our prophylaxis, moreover, extends further than this, for we make it a rule to douche out the vagina with a solution of cyllin during the second stage of labour in all women who are found to be suffering from purulent discharges. The infant's eyes are also wiped with clean linen rags or moist cotton-wool immediately after birth. Wipe from the outer canthus towards the nose, for in this way the eye is more likely to be efficiently cleansed.

Treatment.

The sound eye. If the disease develops in one eye, every

effort should be made to guard the other from infection. Attention will therefore be directed in the first instance to the sound eye. Place the baby on the side which corresponds to the diseased eye, and wipe the sound eye with pledgets of cotton-wool soaked in warm boric lotion in a direction moving towards the nose. Do not use the same pledget twice.

Drop a 1 per cent. solution of nitrate of silver into the eye, and repeat this process night and morning so long as the infant shows a trace of infective inflammation.

Cover the eye in a very thorough manner with numerous small pledgets of cotton-wool soaked in boric lotion. Over this place protective tissue and keep the whole in position by long strips of soap plaster.

The diseased eye. Having by this means secured the sound eye from possible contamination, proceed to treat the inflamed one. Wash it with the boric solution wipes, in a direction opposite to that of the sound eye, namely, the wipes should be moved from the nose towards the outer canthus, the infant remaining as before lying on the side of the bad eye. In this way fear of splashing in the direction of the sound eye is avoided. Do not rest satisfied with the wiping of the outside, but open the lids carefully to permit the lotion to gain entrance to the conjunctiva. The conjunctiva is greatly swollen, and the assistance of another person is often needed before the cornea can be seen and irrigated by squeezing the lotion from the wipe. The baby is best held on the lap with its face looking towards the ceiling and body slightly inclined towards the diseased side.

Show the nurse how to bathe and dress the eyes so that she will be able to carry out the treatment. If such bathing can be carried out every hour during the day and every two hours during the night so much the better, and in addition to this a 2 per cent. solution of nitrate of silver should be dropped in night and morning during the height of the disease, and less frequently, or else a weaker solution substituted, when the inflammation shows signs of abatement.

During the height of the disease cold wet compresses tend to subdue inflammation, but they had better be discontinued when the disease becomes subacute.

The infective nature of the pus is a very great danger. Warn all concerned of the danger of getting the pus into the eyes. Thus when opening the baby's eyelids keep the face away, else the pus may squirt into the eye. The hands, after dealing with the child, must be carefully washed, and all wool or linen used must be burned.

INTUSSUSCEPTION

Infants occasionally develop intussusception, although the disease is more common after the sixth month. Straining, passing mucus and blood by rectum, persistent and loud screaming with or without diarrhoea, are the symptoms that suggest its presence. Careful abdominal palpation will reveal a fusiform or sausage-shaped tumour, usually in the region of the umbilicus. Digital exploration of the rectum at times confirms the diagnosis.

Treatment. Palliative measures have no place in the treatment of intussusception. Immediate abdominal section is the only justifiable procedure.

APPENDIX

STATISTICS, 1903-10.

TABLE NO. I.—*Showing Nature and Number of Cases in Extern Maternity.*

Total deliveries	15,543	Eclampsia	3
Abortions	1,819	Mania	1
Presentations—		Hydramnios	49
Face	42	Prolapse of uterus	1
Face to pubes	142	Rupture of uterus	5
Brow	13	Complete laceration of peri-	
Breech and footling	458	neum	5
Transverse and oblique	71	Phlegmasia	7
Twins	—202	Maternal mortality	57
Triplets	2	Infantile conditions (partial list)	
Prolapse of funis	68	Spina bifida	5
Haemorrhage—		Anencephalus	8
Accidental { 1. Concealed }	47	Hydrocephalus	20
Unavoidable	72	Meningocele	3
Post-partum	183	Talipes	7
" " secondary	3	Intra-uterine amputation of	
" " traumatic	3	arm	1
Operations—		Congenital oedema	1
Forceps	274	Maldevelopment of jaw	1
Versions	147	Pemphigus	1
Manual removal of pla-		Ascites	1
centa	173	Cyclops monster	1
Perforation	4	Fractured skull	3
Decapitation	1	Congenital intestinal ob-	
Hydatidiform mole	5	struction	2
		Papyraceous foetus	1
			*

Extern Maternal Mortality.

Septicaemia	16
Post-partum haemorrhage	9
Accidental haemorrhage	7
Placenta praevia	5
Pulmonary embolus	3
Ruptured uterus	2
Shock from manual removal	2
Cardiac disease	3
Pneumonia	1
Phthisis	1
Pernicious anaemia	1
Uraemia	1

*. Many maldevelopments such as Hare-lip and Cleft palate have not been recorded.

TABLE NO. II.—*Showing Nature and Number of Cases treated in Intern Maternity.*

Total admissions	14,540	Puerperal ulcer	35
„ deliveries	13,924	Mastitis	26
Abortions	413	Galactocoele, very large	1
Hydatidiform mole	7	Rupture of cervix (operative)	9
Primiparae	5,018	Rupture of uterus	8
Presentations—		Atresia of vagina	2
Face	23	Eclampsia	74
Face to pubes	130	Mania	17
Brow	18	Pneumonia	3
Breech and footling	359	Typhoid	1
Transverse and oblique	48	Urticaria herpetiformis	1
Twins	187	Epilepsy	5
Triplets	1	Chorea	1
Impacted shoulders	3	Cutaneous emphysema	1
Prolapse of funis	75	Maternal mortality	49
Lacerated perineum, incom- plete	3,814	Infantile mortality—	
Lacerated perineum, com- plete	15	Died in Hospital	210
Hyperemesis	12	Stillborn—	
Hydramnios	42	Recent	267
Hydorrhoea	2	Macerated	306
Hernia of gravid uterus	1	Putrid	10
Deformed pelvis	91	Infantile conditions (partial list)—	
Haemorrhage—		Anencephalus	19
Accidental	47	Hydrocephalus	12
Unavoidable	41	Spina bifida	21
Post-partum	195	Ophthalmia	18
„ „ secondary	4	Meningocele	2
Haematoma of vulva	6	Encephalocele	2
Operations—		Cephalhaematoma	17
Forceps	527	Cleft palate	9
Version	101	Imperforate anus	8
Induction of labour	46	Absence of radius and thumbs	1
Caesarean section	15	Talipes	32
Hysterotomy	5	Intussusception	1
Pubiotomy	9	Ectropion Vesicae	1
Symphysiotomy	2	Monsters	3
Manual removal of pla- centa	141	Umbilical hernia re- quiring immediate operation	3
Decapitation and Per- foration	4	Foetus papyraceus	1
Phlegmasia alba dolens	8	Genu recurvatum	1

Intern Maternal Mortality.

Septicaemia	15	Pneumonia	3
Pyæmia	6	Phthisis	2
Eclampsia	6	Typhoid fever	1
Labour shock	3	Puerperal insanity	1
Ruptured uterus	2	Chronic endocarditis and ne- phritis	1
Accidental haemorrhage	1	Cardiac disease	2
Concealed accidental haemor- rhage	1	Hemiplegia	1
Placenta praevia	1		—
Post-partum haemorrhage	2		49
Caesarean section	1		

* For other rare abnormalities, see Hospital reports.

TABLE No. III.—*Application of Forceps.*

Indication	No.	Dead Children
Delayed second stage	408	24
Prolapse of cord	17	3
Contracted pelves	20	6
Persistent occipito-posterior	26	3
Eclampsia	15	6
Cardiac disease	5	2
Fibroid uterus	1	0
Early rupture of membranes	3	0
Induction of labour	2	1
Accidental haemorrhage	5	1
Face presentation	2	0
Brow presentation	4	2
Ruptured uterus	1	1
Phthisis	1	0
Threatened rupture of uterus	1	0
Sepsis	2	2
Mania	1	1
Oedema and albuminuria	1	0
Another	1	0
Total	516	52

Showing number of Pregnancy.

I-para	407
II-para	42
III-para	25
IV-para	7
V-para and over	39
Total	520

TABLE No. IV.—*Intern Cases of Accidental Haemorrhage, both revealed and concealed.**Treatment—*

Plugged	22
Untreated	12
Forceps	5
Version	2
Rupture of membranes	6
Total	47

Mortality—

Maternal	2 = 4.25 per cent.
Foetal	27 = 57.44 per cent.

TABLE NO. V.—*Intern Cases of Placenta Praevia.**Treatment—*

Version	34
Spontaneous delivery	7
Total	41

Mortality—

Maternal	2 = 4.87 per cent.
Foetal	27 = 65 per cent.

TABLE NO. VI.—*Causes of Morbidity other than Uterine.*

Alveolar abscess	4
Bronchitis	10
Constipation	44
Cracked nipples	1
Cystitis	2
Eclampsia	18
Enteric fever	1
Erysipelas	2
Haemorrhoids	3
Heart Disease	8
Impetigo	2
Inflammation of symphysis	1
Influenza	22
Mania	2
Mastitis	26
Phlegmasia	8
Pleurisy	1
Pneumonia	9
Puerperal ulcer	35
Pulmonary tuberculosis	11
Pustular eruption on vulva	1
Renal disease	1
Rheumatism	1
Septic sore on chin	1
Septic sore on thumb	2
Slough on thigh (hypodermic)	1
Suppurating abdominal wound	1
Suppurating sinus following nephrectomy	1
Suppurating symphysiotomy wound	1
Syphilis	5
Tonsillitis	1
Tuberculosis of elbow	1
Ulcer, infected, of leg	2
Urticaria herpetiformis	1

YEARLY TABLES

1903-1904. TABLE No. I.—*Cases of Contracted Pelvis.*

Name	Age	Para	Pelvic Measurements					Mode of Delivery	Result to Child	REMARKS
			C.V.	Trans.	Ext. C.	I.-C.	I.-S.			
M. G.	20	I.	8	13	—	—	—	—	Dead	Symphysiotomy.
M. H.	23	I.	8	13	15	23	24	—	Alive	Caesarean section.
H. H.	24	I.	8	13	17	—	24	Forceps	Alive	Coxalgia.
M. M.	32	VII.	9½	13	—	—	—	Version	Dead	Induced labour.

TABLE No. II. A.—*Morbidity.*

Temperature	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Total
100.8° to 101.2°	3	4	3	3	5	4	5	6	1	—	1	2	37
101.2° to 102.2°	—	1	4	8	4	4	4	3	5	2	2	1	38
102.2° to 104°	1	1	4	2	10	7	6	5	5	8	5	4	58
104° and above	—	—	—	—	7	4	3	5	2	4	—	1	26
Total	4	6	11	13	26	19	18	19	13	14	8	8	159
Percentage													8.42

TABLE No. II. B.

Temperature	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Total
99°, P. 90	9	11	13	14	28	19	26	20	19	18	15	10	202
Percentage													10.70

1904-1905. TABLE No. I.—Cases of Contracted Pelvis.

Name	Age	Para	Pelvic Measurements				Mode of Delivery	Result to Child	REMARKS
			C.V.	Trans.	Ext. C.	I.-C.	I.-S.		
S. F.	33	II.	7	11½	20	27	23	Spontaneous	Labour induced.
A. O'R.	29	I.	5½	11	17	24½	25	Caesarean section	Alive
J. B.	34	IV.	6½	10½	—	25½	25½	Caesarean section	Alive
M. T.		II.	7½	10	17	24	24	Forceps	Dead
M. F.	26	I.	6	—	15½	27	27	Caesarean section	Dead
E. C.	41	XI.	8	11½	18	23	30	Spontaneous	Labour induced.
A. O'C.	36	I.	8½	—	18½	28	28	Forceps	Head above brim.
E. S.	36	IV.	9¼	—	18	27	24	Version	Alive
E. F.	33	III	8½	10	17½	27½	25	Forceps	Other deliveries, induced labour. This was full term.
A. P.	23	II.	7¾	—	16½	28½	27	Caesarean section	Caesarean section, second time.
B. M.	33	I.	7¼	11¾	17	27	25	Version	Face presentation.
M. C.	36	II.	9	—	—	—	—	Version	Prolapse of cord.

1904-1905. TABLE No. II. A.—*Morbidity 100 8° and over.*

Temperature	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Total
100·8° to 101·2°	1	6	4	3	3	1	1	2	7	3	2	3	36
101·2° to 102·2°	6	2	3	5	2	8	5	—	3	2	7	6	49
102·2° to 104°	3	6	4	1	4	2	4	3	2	6	3	6	44
104 and over		—	—	2	—	—	—	1	—	—	1	1	5
Total	10	14	11	11	9	11	10	6	12	11	13	16	134
Percentage													7·03

TABLE No. II. B.—*Temperature and Pulse over 99° and 90.*

	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Total
Temp. and pulse over 99° and 90	10	12	8	6	13	10	12	16	8	11	11	10	127
Percentage													6·67

1905 1906. TABLE No. I.—*Contracted Pelves.*

Name	Age	Para	Pelvic Measurements					Mode of Delivery	Result to Child	REMARKS
			C. V.	Trans.	Ext. C.	I.-C.	I.-S.			
M. H.	30	II.	8	13	15	28	25	Caesarean section	Alive	Second operation.
S. F.	34	III.	7	11.5	20	27	28	Version	Dead	Induction at 36th week; 2nd time.
M. K.	43	XI.	6	11.5	18	31	29	Spontaneous	Alive	Induction, 37th week; 8th time.
M. G.	22	II.	8	13	—	—	—	"	"	Symphysiotomy performed previously.
E. K.	27	III	9	11.5	18.5	29	27	Forceps	Dead	Induction, 39th week; 3rd induction.
M. W.	27	II.	7.2	—	18	28	26	Spontaneous	Alive	Labour prolonged for 20 hours; previous confinement normal.
S. M.	23	III.	7.2	13	18	31	31	Version	Dead	Labour induced, 37th week; head did not fix, so podalic version was done.
T. M.	28	III.	7	12	17	27	27	Spontaneous	"	Induction, 23th week; breech presentation. Previous labours, 1st term, forceps; 2nd term, version.
J. F.	24	III.	7.7	11.2	20.5	28	27	Expression	Alive	Induction, 38th week; prolapse of cord. Previous labours, term, forceps; both children dead.
M. P.	16	I.	8	11.5	19	25	25	Spontaneous	"	Face presentation.
L. K.	21	I.	6.8	—	15.5	26	24.5	Forceps	"	Prolonged labour; small head, which moulded well.
G. L.	27	I.	7	11	20	27	26.5	Expression	"	Induction, 32nd week; compound presentation, head and hand. Small child; weight, 4½ lbs.
M. T.	30	III.	7.5	10	17.5	24	24	Forceps	"	Term, occipito-posterior. Dorsal curvature.

TABLE No. II. C.

Number of Lacerated Perineums showing Morbidity for Year.

English estimation	33
Rotunda	10
Both	28
	—
Total	71

Operative Cases showing Morbidity.

Forceps (English, 3 ; Rotunda, 2 ; both, 8)	13
Manual removals (English, 2 ; Rotunda, 1 ; both 5)	8
Induction of labour (English, 1)	1
Abortion removal (English, 1)	1
Breech (English, 1 ; both, 1)	2
Plugging for P.P.H. (both, 1)	1
	—
Total	26

1906-1907. TABLE No. I.—*Contracted Pelves.*

All internal measurements made with Skutsch Pelvimeter.

Name	Age	P ra	Pelvic Measurements					Mode of Delivery	Result to Child	REMARKS
			C. V.	Trans.	Ext. C.	I.-C.	I.-S.			
E. L.	28	I.	6.5	10	16.5	29	27	Pubiotomy. Version	Alive	Prolapse of cord; manual removal of placenta.
S. M.	27	IV.	6	—	16.5	31.5	30	Caesarean section	Alive	Walcher position for one hour before forceps; head advanced into pelvis and stopped.
C. S.	24	V.	7.5	12	19	26	23	Pubiotomy. Forceps	Dead	Spontaneous delivery. Os fully dilated before operation.
B. G.	33	IV.	8	11.5	18.5	30	25	Pubiotomy	Alive	History of previous dead children.
A. W.	26	III.	8	11	17.5	27.5	25	Forceps	Alive	Hydramnios. History of 10 full term pregnancies with forceps delivery; 5 dead children.
A. M. K.	42	XI.	7	12	18	27	25	Induced labour. Bougies 3 days in succession. Membranes ruptured. Int. version and immediate delivery	Alive	Marked exostosis on int. surface of pubes.
S. N.	24	II.	9	12	18	26	22	Forceps failed. Version with difficulty	Dead	Mother died; general peritonitis.
L. B.	24	I.	7	—	18	27	24	Forceps unsuccessful. Pubiotomy and forceps	Alive	
M. B.	24	I.	8	11.5	17	27	24	Spontaneous delivery	Alive	
M. C.	30	I.	5.4	9.7	15.5	24.5	23	Caesarean section	Alive	Achondroplastic dwarf.
E. T.	30	I.	7	11	—	—	—	Induction labour. Version.	Macerated	Hydramnios.
M. A.	32	I.	6.25	11.25	17.5	27	25	Caesarean section	Alive	
S. F.	36	IV.	7	11.5	20	28	27	Pubiotomy. Spontaneous delivery	Alive	
D. K.	23	II.	7.75	—	16	27	24	Spontaneous delivery	Alive	

1906-1907. TABLE NO. III. A.—*Morbidity.*

British Medical Association Estimation	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Total
Total Cases	152	149	148	137	165	144	177	150	159	165	149	146	1811
Cases Morbid	15	9	11	12	14	8	11	11	5	10	3	9	118
Percentage	9.86	6.04	7.43	8.75	8.48	5.55	6.21	7.33	3.14	6.06	2.01	6.16	6.41
Total number . 118													
Total percentage . 6.41													

TABLE NO. III. B.

Rotunda Estimation	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Total
Total Cases	158	153	153	142	168	148	181	156	162	172	156	153	1902
Cases Morbid	7	4	5	12	10	3	8	8	5	5	5	4	76
Percentage	4.43	2.61	3.27	8.45	5.95	2.02	4.42	5.13	3.09	2.90	3.21	2.61	3.99
Total number . 76													
Total percentage . 3.98													

TABLE NO. III. C.—*Lacerated Perineums showing Morbidity for Year.*

English estimation	.	.	.	.	.	.	.	23
Rotunda „	.	.	.	.	.	.	.	1
Both estimations	.	.	.	.	.	.	.	25
Total	.	.	.	.	.	.	.	49

TABLE NO. III. D.—*Operative Cases, showing Morbidity.*

Forceps (English, 5; both, 4)	.	.	.	.	.	9
Manual removals (English, 1; both 4)	.	.	.	.	.	5
Induction of labour (both, 1)	.	.	.	.	.	1
Abortion (both, 1)	.	.	.	.	.	1
Placenta praevia (English, 1; both, 2)	.	.	.	.	.	3
Pubiotomy (both, 1)	.	.	.	.	.	1
Breech (English, 1)	.	.	.	.	.	1
Total	.	.	.	.	.	21

Eleven of these cases associated with lacerated perineum; one case of placenta praevia had manual removal not listed. Pubiotomy, associated with forceps and manual removal, not separately listed.

1907-1908. TABLE No. I.—*Contracted Pelves.*
All internal measurements made with Skutsch Pelvimeter.

Name	Age	Para	Pelvic Measurements					Mode of Delivery	Result to Child	Weight of Child	Result to Mother	REMARKS
			C. V.	Trans.	Ext. C.	I. C.	I. S.					
A. F.	35	IV.	6.25	—	17.5	25	24	Cæsarean section	Alive	—	Died	See Mortality Table.
A. W.	24	IV.	8	11	18.5	27	25	Natural	Dead	7½	Recovery	Prolapsed pulseless cord on admission; depressed fracture right parietal bone. Pubiotomy, May, 1907.
E. B.	24	II.	8.5	10.5	19	27	25	Natural	Alive	7¼	Recovery	
A. M'E.	31	I.	6.75	11	18	25	22.5	Induction of prem. labour	Dead	5¼	Recovery	Came up long before term.
J. T.	35	VI.	8.75	—	17	24	23.5	Natural	Alive	8¼	Recovery	
C. G.	20	I.	9	—	16.5	24	20	Natural	Alive	5½	Recovery	Head ballotting above brim until os fully dilated.
K. O'C.	36	X.	9	—	21	29.5	27	Internal version	Alive	9¼	Recovery	Head unfixed; os fully dilated. History of previous normal deliveries—vertex and breech.
E. R.	25	I.	9	—	17	24	23	Walcher's position Natural delivery	Alive	6¼	Recovery	Patient in labour 24 hours; head unfixed. Walcher's position, 45 minutes; head fixed, and child born in 3 hours.
N. D.	23	I.	9	12	19.25	29.5	28	Internal version	Dead	7½	Recovery	Membranes ruptured 12 hours before admission. Prolapse of cord and hand.
M. B.	31	I.	8	11.20	18.5	28.5	26	Forceps	Dead	—	Recovery	

1907-1908. TABLE No. II.—*Eclampsia*.

Name	Age and Para	Condition on Admission	Urine	No. of Fits			Treatment	Result to Mother	Result to Child	REMARKS
				Before Labour	During Labour	After Labour				
M. B., admitted Nov. 9, '07	28 years II.	Had a fit on the way to waiting ward	Albumen abundant	2	—	—	Morphine; purgatives; enemias (3). Delivered Nov. 10, '07	Rec.	A	Admitted twenty-four hours before delivery, not in labour.
E. M., admitted Dec. 10, '07	30 years II.	Unconscious	Albumen abundant	6	—	—	Morphine; stomach and bowel washed out; enema; purgatives. Delivered Dec. 11, '07	Rec.	A	Semi-conscious up to time of delivery.
B. D., admitted Dec. 23, '07	24 years I.	Unconscious	Albumen abundant	—	6	—	Morphine; purgatives; forceps; os three-quarter open. Delivered Dec. 23, '07	Rec.	A	Admitted in labour.
S. H., admitted Jan. 1, '08	32 years I.	Unconscious	Albumen abundant	13	—	—	Morphine; stomach and bowel washed out; bled 12 oz.; saline intravenous 1½ pts.; purgatives; stimulation. Delivered Jan. 1, '08	Died 1/2/'08	D	Patient operated on about a year before admission after eight years' sterility; posterior division was done. No fit for forty-four and a half hours before death. Conscious for several hours before delivery. See Mortality Report.
M. K., admitted Mar. 11, '08	20 years I.	Apparently in good health; in labour	Albumen abundant	—	—	2	Morphine; bowel washed out; purgatives. Delivered Mar. 12, '08	Rec.	A	Fits started two and a half hours after delivery.

1907-1908. TABLE No. II.—*continued.*

Name	Age and Para	Condition on Admission	Urine	No. of Fits		Treatment.	Result to Mother	Result to Child	REMARKS
				Before Labour	During Labour	After Labour			
E. C., admitted Mar. 14, '08	18 years I.	Unconscious; oedema of labia and legs	Albumen abundant	10	—	—	Rec.	D	Twins; premature; six months.
L. S., admitted Apr. 11, '08	28 years I.	Unconscious. History of two weeks' oedema	Albumen abundant	13	—	—	Rec.	D	Twins; one macerated. Patient had phthisis.
M. N., admitted Apr. 19, '08	39 years I.	Unconscious	Albumen abundant	10	—	—	Rec.	D	
M. G., admitted May 27, '08	20 years I.	Unconscious	Albumen abundant	Several before admission; 3 after	—	—	Rec.	D	Conscious twenty-four hours before onset of labour.
J. C., admitted June 2, '08	27 years I.	—	Albumen abundant	—	—	20	Rec.	A	Child died shortly after birth. Fits started three and a half hours after delivery.
M. B., admitted June 5, '08	35 years I.	Apparently in good health	Albumen abundant	—	—	1	Rec.	A	Twins. Fits started two and a half hours after delivery.
M. H., admitted June 8, '08	21 years I.	Apparently in good health	Albumen abundant	—	6	—	Rec.	A	Glycosuria and albuminuria; post-partum haemorrhage.

1907-1908.

TABLE NO. IV.—*Operative Cases, showing Morbidity.*

Forceps (both, 7 ; English, 7 ; Rotunda, 1)	15
Incomplete abortion (both, 1)	1
Induction of abortion (both, 1)	1
Induction of labour (both, 1)	1
Manual removal of adherent Placenta (both, 1 ; English, 1)	2
Placenta praevia. Version (both, 2)	2
Ruptured uterus (English, 1)	1
Total.	23

Of these cases twelve forceps cases associated with lacerated perineums ; one version associated with lacerated perineum ; one forceps case associated with manual removal of adherent placenta not separately listed.

TABLE NO. IV. A.—*Percentage Operative Morbidity,
B.M.A. Estimation.*

Forceps	17·28 per cent.
Manual removals	22·22 per cent.
Version for placenta praevia	25·00 per cent.

TABLE NO. V.—*Lacerated Perineums showing Morbidity.*

B.M.A. estimation alone	16
Rotunda „ „	3
Both estimations	10
Total	29

Of these cases twelve were associated with forceps ; one was associated with eclampsia.

The following Tables are based on those cases morbid by B.M.A. Estimation :—

TABLE NO. VI.—*Duration of stay in House of Morbid Cases.*

Under 10 days	46, including 2 deaths.
10-19 days	50, including 3 deaths.
20-29 days	6, including 1 death.
30-39 days	3
40-49 days	2, including 1 death.

1907-1908.

TABLE No. VII.—*Duration of Temperature.*

Under 10 days	.	.	.	.	86, including 4 deaths.
10-19 days	.	.	.	.	15, including 1 death.
20-29 days	.	.	.	.	3
30-39 days	.	.	.	.	1
40-49 days	.	.	.	.	1, including 1 death.

 106

One death, Caesarean section, unaccompanied by temperature.

TABLE No. VIII.—*Highest Temperature Recorded.*

100°	.	.	100·9°	.	.	31, including 1 death.
101°	.	.	101·9°	.	.	37, including 2 deaths.
102°	.	.	102·9°	.	.	21, including 1 death.
103°	.	.	103·9°	.	.	12, including 1 death.
104°	.	.	104·9°	.	.	5, including 1 death.

 106

Of the 2,060 cases delivered, 126 showed a temperature over 100·4° F., but 20 of these occurred on the first day, and did not come under the morbidity rule of the B. M. A.

TABLE No. IX.—*Treatment of Morbid Cases.*

No treatment	.	.	.	.	.	42
Vaginal douche only	.	.	.	.	.	10
Uterine douche	.	.	.	.	.	51
Quinine only	.	.	.	.	.	4

 107

In 9 cases quinine was given in conjunction with other treatment.

Antistreptococcal serum was used in 4 cases, including 1 case that died.

TABLE No. X.—*Uterine Douches.*

20 cases received 1 douche.
13 cases received 2 douches.
10 cases received 3 douches.
4 cases received 4 douches.
3 cases received 6 douches.
1 case received 7 douches.

 51

For report of uterine cultures, see Pathological Report.

1908-1909. TABLE No. I.—*Contracted Pelves.*
All internal measurements made with Skutsch Pelvimeter.

Name	Age	Para	Pelvic Measurements				Mode of Delivery.	Result to Child	Weight of Child	Result to Mother	REMARKS
			C. V.	Trans.	Ext. C.	I.-C.	I.-S.				
J. W.	50	I.	8	10	17	26	25½	Breech. Normal	A	A	Premature 7 months. Baby died in 2½ hours.
B. G.	19	I.	8	11	17	25	23½	Vertex. Normal	A	A	Head fixed late in labour. Walcher's position. Scopolamine and morphine.
E. D.	22	I.	8	10	18½	26	22	Vertex. Normal	A	A	Previous children dead born. One prolapsed cord and fractured skull. Others forceps and fractured skulls.
A. W.	25	V.	8	11	18½	27	25	Caesarean section	A	A	Prolapse of cord. Brow. Aftercoming head stuck. Perforated.
M. A. K.	22	I.	7.5	—	17½	26½	25	Bi-polar version. Perforation	D	A	Prolapsed cord, stopped pulsating when version started. Membranes ruptured some hours and liquor amnii drained away.
E. G.	26	II.	8½	10½	18	26½	24	Internal version	D	A	Prolapse of cord. Breech unfixed. Great difficulty with aftercoming head.
J. M.	19	I.	8	12	16	28	26	Breech. Extraction	A	A	Head presenting. Cord prolapsed.
L. B.	35	I.	6	10½	17½	27½	25½	Version	D	A	Membranes ruptured with onset of labour.
M. D.	23	I.	8	12½	19	23	26	Symphysiotomy. Version	D	A	First child normally delivered dead.
C. K.	23	I.	8	11½	20	26	25	Normal	A	A	Macerated.
C. S.	33	II.	9	12¼	20½	28	25½	Induction of labour. Forceps	A	A	Transverse. Macerated.
A. T.	25	I.	7	11½	16	26	27	Breech	D	A	
M. S.	24	III.	8½	—	—	—	—	Version	D	A	
M. G.	35	I.	6	—	16	26	25½	Hysterotomy	A	A	

1908-1909. TABLE No. II.—*Eclampsia*.

Name	Age and Para	Condition on Admission	Urine	No. of Fits			Treatment	Result to Mother	Result to Child	REMARKS
				Before Labour	During Labour	After Labour				
C. D. admitted Feb. 2, '09	29 yrs. I.	Conscious	Albumen abundant	—	—	6	Morphine. Bowel washed out (2). Purgatives. Infusion under breasts. Poultices to loins. Morphine. Stomach washed out. Purgatives.	Rec.	A D	Delivered Feb. 2. First fit 9 hours later.
C. M. admitted Feb. 18, '09	23 yrs. II.	Conscious	Albumen abundant	—	—	1	Morphine. Stomach washed out. Purgatives.	Rec.	A	Delivered Feb. 18. Fit 1½ hours later.
T. K. admitted June 10, '09	46 yrs. I.	Unconscious	Albumen abundant	8	1	—	Morphine. Stomach washed out. Bowel washed out. Poultices to loins. Purgatives.	Rec.	D	Delivered June 11.
B. I. admitted June 14, '09	34 yrs. I.	Conscious	Albumen abundant	—	—	5	Morphine. Bowel washed out (2). Purgation.	Rec.	A	Delivered June 14. First fit two hours after delivery.
E. H. admitted June 15, '09	29 yrs. I.	Unconscious	Albumen abundant	8	1	1	Morphine. Stomach washed out. Bowel washed out. Purgatives. Poultices to loins. Stimulation. Oxygen. Artificial respiration (three times). Morphine. Bowel washed out. Forceps.	Rec.	D	Chloral gr. xx before admission. Pulse very poor, cyanosis on admission. 3 times during day respiration ceased altogether. Delivered June 15. Fit during second stage. Delivered July 29.
M. W. admitted July 29, '09	40 yrs. II. 1st preg. abortion	Oedema of legs. Conscious	Albumen abundant	—	1	—	Morphine. Bowel washed out. Forceps.	Rec.	A	Fit during second stage. Delivered July 29.
M. McK. admitted Sept. 30, '09	20 yrs. I.	Unconscious	Albumen abundant	4	—	—	Morphine. Bowel washed out. Poultices to loins. Purgatives.	Rec.	D	Child macerated. Delivered Oct. 5.

1908-1909.

TABLE No. III. A.—*Morbidity.*

British Medical Association Estimation	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Total
Total Cases . . .	165	152	137	149	178	171	171	169	182	204	166	129	1973
Cases Morbid . . .	4	3	4	4	9	6	5	7	7	9	8	7	73
Percentage . . .	2.42	1.98	2.92	2.68	5.06	3.51	2.92	4.14	3.84	4.41	4.82	5.43	3.70
Total number . . . 73 Total percentage . . . 3.70													

TABLE No. III. B.

Rotunda Estimation	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Total
Total Cases . . .	169	153	140	154	183	177	176	180	193	212	175	183	2045
Cases Morbid . . .	5	2	3	3	9	4	2	4	4	8	5	2	51
Percentage . . .	2.96	1.31	2.14	1.95	4.92	2.26	1.14	2.22	2.07	3.77	2.86	1.50	2.49
Total number . . . 51 Total percentage . . . 2.49													

TABLE No. IV.—*Operative Cases showing Morbidity.*

Forceps (both, 4 ; B.M.A., 4)	8
Induction of labour (B.M.A., 2)	2
Manual removal of placenta (both, 2 ; B.M.A., 3)	5
Rupture of membranes for hydramnios (both 1)	1
Post-partum haemorrhage (both 1)	1
Symphiotomy (B.M.A., 1)	1
Version (B.M.A., 2)	2

—
20TABLE No. IV. A.—*Percentage Operative Morbidity,*
B.M.A. Estimation.

Forceps	9.88 per cent.
Manual removal	33.33 per cent.

TABLE No. IV. B.—*Rotunda Estimation.*

Forceps	4.94 per cent.
Manual removals	13.33 per cent.

1909-10. TABLE No. I.—*Contracted Pelves.*
All internal measurements made with Skutsch's Pelvimeter.

Name	Age	Para	Pelvic Measurements					Mode of Delivery	Result to Child	Weight of Child	Result to Mother	REMARKS
			C. V.	Trans.	Ext. C.	I.-C.	I.-S.					
R. N.	30	I.	8.5	12.4	19.5	26.5	23.5	Subcutaneous pubiotomy forceps	Alive	8	Recovered	Walked 17th day. Baby died 11th day of congenital syphilis. Sixty-four hours in labour, forceps failed to deliver. X-ray showed fibrous union. Measured after pubiotomy. Sent in from extern. Membranes ruptured 30 hours. F. H. 100. Head fixed while patient was being brought in cab. Sent in from extern. 24 hours in labour. Examined by 8 different men. Infection of superficial wound. First labour pubiotomy. Second transverse version, perforation.
C. N.	39	VII.	7.8	13.4	16	23.5	28	Forceps	Dead	8	"	
E. L.	28	III.	6.5	10	16.5	29	27	Extra-peritoneal Caesarean section	Alive	9 $\frac{1}{8}$	"	
M. G.	23	IV.	8	13	18.5	27	25	"	"	7 $\frac{3}{8}$	"	Labour 20 hours. Walcher's position 9 $\frac{1}{2}$ hours. Os fully dilated. Bandl's ring nearly to umbilicus. Foetal heart 160-170. Temperature 99°. Pulse 86. First labour symphysiotomy; 2nd and 3rd normal.

TABLE NO. I.—*continued.*

Name	Age	Para	Pelvic Measurements				Mode of Delivery	Result to Child	Weight of Child	Result to Mother	REMARKS
			C.V.	Trans.	Ext. C.	I.-C.	I.-S.				
E. B.	19	II.	8	—	16.5	28.5	26	Alive	7 $\frac{5}{8}$	Recovered	First labour normal.
M. F. M.O.C.	22 34	I. II.	9 9	— —	19 19	26.75 26	25.5 24	" "	5 $\frac{1}{4}$ 6 $\frac{7}{8}$	" "	— First child stillborn.
M. K.	22	IV.	9.2	12.4	18	26.5	25	"	6 $\frac{7}{8}$	"	First three children stillborn from prolapse of cord.
E. F.	24	I.	8	12.8	20	27	25	"	7 $\frac{1}{4}$	"	Thirty-two and a half hours in labour. Head fixed late in first stage. Came down in transverse diameter. Fractured skull, half the head crushed in. Immediately raised with one blade of bullet forceps. Died 3rd day deeply jaundiced. Autopsy showed skull and brain uninjured.
R. T.	34	VI.	6.2	13.2	17	28.5	27	"	5 $\frac{5}{8}$	"	

TABLE No. I.—*continued.*

Name	Age	Para	Pelvic Measurements					Mode of Delivery	Result to Child	Weight of Child	Result to Mother	REMARKS
			C. V.	Trans.	Ext. C.	L. C.	I. S.					
M. N.	27	I.	6	11.6	16.5	27	26	Perforation and cephalotripsy	Dead	71 $\frac{5}{8}$	Recovered	Pulseless cord presenting. Fifty hours in labour.
F. M.	25	I.	9	12	16	24.5	22.5	Spontaneous ver-tex	Alive	53 $\frac{3}{4}$	"	Head fixed during first stage.
S. M.	28	VII.	9.2	12	19	28	27	Bipolar version, placenta praevia, prolapse of cord	"	83 $\frac{3}{8}$	"	Always had prolapse of cord.
M. K.	40	XI.	9	—	22	32	28	Perforation and cephalotripsy	Dead	81 $\frac{1}{2}$	"	Child dead. Forceps slipped.
B. M.	22	I.	8.2	11.2	—	—	—	Spontaneous ver-tex	Alive	6	"	Head fixed end of first stage.
B. S.	24	V.	7.6	12.2	18	25	23	Transverse bi-polar version	"	6	"	—
C. S.	28	VII.	7.5	12	19	26	23	Spontaneous ver-tex	"	73 $\frac{3}{4}$	"	Measurements taken before pubiotomy in 1907. Pubiotomy 1907. Spontaneous delivery 1908.
S. M.	28	V.	6	9	16.5	31.5	30	Caesarean section	"	7	"	Caesarean section.
E. S.	21	I.	8.6	11.4	18	27.5	25	Forceps	"	61 $\frac{1}{2}$	"	—
J. W.	32	II.	8	10	18	27	25	"	"	58 $\frac{7}{8}$	"	Child died 4th day.

TABLE No. I.—*continued.*

Name	Age	Para	Pelvic Measurements					Mode of Delivery	Result to Child	Weight of Child	Result to Mother	REMARKS
			C. V.	Trans.	Ext. C.	I.-C.	I.-S.					
E. F.	22	III.	8.8	11.6	16	24	21	Transverse external version, spontaneous vertex	Dead	7 $\frac{1}{4}$	Recovered	Extensive cerebral haemorrhage. Child alive when 2nd stage started. Foetal heart 132. Second stage lasted one hour. Membranes ruptured 10 hours. Cord tightly around neck.
M. D.	24	III.	8	12.8	18	28	25	Prolapse of cord, internal version, subcutaneous pubiotomy	Alive	6 $\frac{3}{4}$	"	First labour, symphysiotomy, July, 1909. Second pregnancy, abortion, November, 1909.
M. O'S.	27	IV.	7	—	17	29	27	Subcutaneous pubiotomy, forceps	"	7 $\frac{5}{8}$	"	Previous labours forceps. Children stillborn. Second stage 4 hours. Walcher's position 4 hours. Head made no attempt to fix.
M. C.	33	III.	8.2	13	18.5	27	24.5	Subcutaneous pubiotomy, forceps	"	7	"	Previous labours perforation. Labour this time 38 hours. Walcher's position 20 hours. Forceps failed.

1909-1910.

TABLE No. III. A.—*Morbidity.*

British Medical Association Estimation	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Total
Total Cases . . .	160	161	167	162	197	165	188	185	217	199	190	156	2147
Cases Morbid . . .	7	1	8	10	18	6	8	7	9	5	8	6	93
Percentage . . .	4.37	0.62	4.79	6.17	9.14	3.64	4.26	3.78	4.15	2.51	4.21	3.85	4.33
<div style="text-align: right;"> Total number . . . 93 Total percentage . . . 4.33 </div>													

TABLE No. III. B.

Rotunda Estimation	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Total
Total Cases . . .	166	167	174	167	204	171	194	187	226	203	197	166	2222
Cases Morbid . . .	3	3	4	4	12	6	7	3	5	1	4	6	58
Percentage . . .	1.81	1.80	2.30	2.39	5.88	3.51	3.61	1.60	2.21	0.49	2.08	3.61	2.61
<div style="text-align: right;"> Total number . . . 58 Total percentage . . . 2.61 </div>													

TABLE No. IV.—*Operative Cases, showing Morbidity.*

Forceps (both, est. 6 ; B.M.A., est. only 3)	. . . . .	9
Accidental haemorrhage (both, est. 1)	. . . . .	1
Post-partum haemorrhage (B.M.A., est. 1)	. . . . .	1
Manual removal of placenta (both, est. 3)	. . . . .	3
One associated with placenta praevia not separately listed.		
Placenta praevia (B.M.A., est. only 1)	. . . . .	1
Total		15

TABLE No. IV. A.—*Percentage Operative Morbidity,*
B.M.A. Estimation.

Forceps	9.68 per cent.
Manual Removals	15.79 per cent.
Placenta Praevia	20.00 per cent.

TABLE NO. V.—*Lacerated Perineums, showing Morbidity.*

B.M.A., estimation alone	16
Rotunda „ „	2
Both estimations	18
Total	36

8 of these associated with forceps.

The following Tables are based on those cases morbid by the B.M.A Estimation:—

TABLE NO. VI.—*Duration of stay in House of Morbid Cases.*

Under 10 days	46, including 3 deaths.
10-19 days	39, including 1 death.
20-29 days	7
39-40 days	1
40 and over	1
Total	93

TABLE NO. VII.—*Duration of Temperature.*

Under 5 days	69, including 1 death.
5-9 days	16, including 1 death.
10-19 days	5
20-29 days	1
Total	91

Two patients died without having had fever.

TABLE NO. VIII.—*Highest Temperature recorded.*

100°	100.9°	31
101°	101.9°	21
102°	102.9°	19, including 1 death.
103°	103.9°	11
104° and over		9, including 1 death.
Total		91

Two patients died without having had fever.

TABLE NO. IX.—*Treatment of Morbid Cases.*

No treatment	31
Vaginal douche only	2
Uterine douche	48
Quinine only	4
Local treatment	8
Total	93

Of these 93 morbid cases 32 had incomplete membranes, and 17 had retention of lochia due to ante flexion of the uterus.

TABLE No. X.—*Uterine Douches.*

24 patients had 1 douche.
13 patients had 2 douches.
6 patients had 3 douches.
3 patients had 4 douches.
1 patient had 5 douches.
1 patient had 9 douches.

Total . 48

For report of uterine cultures see Pathological Report.

THE CAUSE AND CURE OF ECLAMPSIA

BY HASTINGS TWEEDY, F.R.C.P.Irel..

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DURING the seven years of my Mastership of the Rotunda Hospital, which terminated last November, I was responsible for the treatment of 77 cases of eclampsia. Six of these patients died, a percentage mortality of 7.61 per cent. These are the best statistics for the same period that have ever been published from the Rotunda Hospital, and for this reason must arrest attention. The results are open to one of three interpretations :—

1. The disease has become milder.
2. Greater laxity in diagnosis.
3. More satisfactory treatment than heretofore.

The first explanation—that is, the disease has become milder—can be dismissed in a few words. The annual hospital reports have clearly demonstrated that very severe cases were encountered. It is impossible to believe that the appearance of a mild form of the disease would exactly correspond to the beginning of my term of office and continue for seven years. Although every one recognizes the fact that a series of severe cases may be followed by another series of a much milder nature, no one has suggested that eclampsia of a mild degree would be manifested for seven years.

Before Sir William Smyly reintroduced the morphia treatment the mortality in the Rotunda Hospital was 35.3 per cent. It fell to 20 per cent. in those cases treated by morphia during his Mastership and that of his successor.

The second explanation—namely, that there was greater laxity in the diagnosis of the disease—is not true, for it will

be seen from the following how very rigidly spurious cases are excluded:—

1. All deaths associated with convulsions occurring after the sixth month of pregnancy have been considered as due to eclampsia. Before the sixth month the diagnosis rests on the pathological findings. If there is obvious chronic renal disease it should not be classed as a case of eclampsia.

2. No woman who gives a history of previous fits unconnected with pregnancy or labour should be included, nor has such a case been included in our list.

3. We have not included any case of convulsions free from albuminuria. This limitation is of the utmost importance, for there are many conditions which simulate eclampsia, such as epilepsy, heat-stroke, &c.

4. An unconscious pregnant woman, who shows marked toxic symptoms after the sixth month, with albuminuria, is considered to have eclampsia, whether or not she has had convulsions.

It is possible that some cases of true eclampsia may pass unrecorded, but, on the other hand, if a less stringent definition is accepted, it is absolutely certain that many spurious cases will be included in a statistical table.

The third explanation—that the treatment is more satisfactory than heretofore—is the correct one. This treatment is based on observations made by me whilst still Assistant Master in the Rotunda Hospital during the year 1895. I then observed that neither medicine nor food could be safely placed in the mouth of an unconscious patient. If placed in the mouth they are likely to find their way into the lungs rather than into the stomach, thus predisposing to bronchial inflammations and leading to pulmonary oedema. I demonstrated that digestion was in abeyance during the unconscious state, and that the presence of food in the stomach increased the severity of eclampsia. These views were incorporated by me in a paper read in 1896 before the Obstetrical Section of the Royal Academy of Medicine in Ireland, and I there advocated stomach lavage, administration of purgatives by the stomach tube, poultices to the loins, rectal and intravenous injections of salt solution. I also insisted on the importance of keeping the patient in the side position to enable mucus to drain readily from the mouth, holding that were it allowed

to collect in the pharynx it would cause spasm of the glottis, a fruitful source of asphyxia. I was then, and am still, a firm believer in morphine, which was administered under the direction of Sir William Smyly.

These, then, were my opinions on re-entering the Rotunda Hospital as Master, but it was left to my staff to carry them out in practice. It did not occur to me that it might be dangerous to give milk to a patient who could swallow naturally or who had recovered consciousness. Neither did I realize how difficult and uncertain was the carrying out of all details of treatment by those not specially trained. Above all, I was unaware that the presence of a properly instructed doctor frequently determined the safety of the patient, who must inevitably have died had the case been left in the charge of a couple of probationer nurses. My knowledge only extended to the observation that digestion was in abeyance during the period of unconsciousness. I considered I was supporting the patient's strength and preventing heart failure by administering nourishment to a woman who had struggled to consciousness through this terrible disease.

The statement that I have now to make is that food is the actual exciting cause of eclampsia, and the primary cause of the toxæmia giving rise to heart failure. This has been partially known for years, as proved by the popularity of an all-milk diet as a prophylactic against eclampsia. But that the blandest forms of food—milk, whey, &c.—could have any harmful effect was a point that required very convincing proof. It was because of their irritating effect that foodstuffs have been considered by many to excite convulsions; and this view I fully accepted until recently. I thought I recognized decomposition as a factor in the disease, but it seems doubtful if the deleterious action could be thus accounted for. As an irritant it would be hard to conceive any food as drastic as croton oil, yet experience in the administration of this drug enables me to say that it shows no tendency to increase the severity of eclampsia. In respect to decomposition, fits at times recur so soon after the administration of whey as to preclude the possibility of decomposition. It seems probable, therefore, that food particles are permitted to

enter the circulation ununited with, or incapable of uniting with, their proper antibodies. Many observers have endeavoured to prove the existence of an anaphylactic condition in eclampsia, and most of them have centred their attention on the placenta as the offending structure. So far as I know, it has never been suggested that substances taken by the stomach can act as anaphylactic poisons. In other words, the epithelium of the intestinal tract has been assumed to be protective in this particular. Why it should be so is at least surprising. All other structures of the body are liable to degeneration. The kidney epithelium when diseased permits the passage of albumen; similarly the liver and the pancreas can cease to functionate. Why this universal rule should be withheld from the stomach epithelium would be wonderful if it were true. But that it is not true will be proved in the further study of eclampsia.

Pregnancy is, of course, a necessary predisposing cause, and the reason for this I cannot explain; but it is quite easy to theorize on the subject. Observation has shown us that many pregnant women do not drink enough fluid. Concentration of the toxins which arise from maternal and foetal waste may overtax the excretory organs and cause degeneration. The curious cravings which some pregnant women experience, due entirely to accumulation of toxins, will cause much indigestible food to be taken, and this food is frequently incompletely masticated. Thus potato skins, lumps of apparently raw cabbage, orange pulp, &c., have been removed from the stomach and bowel by lavage. Of my six fatal cases I desire to call attention to five, for though nominally responsible for the sixth, I was actually away from the hospital, and have no personal knowledge of the details. The others will indicate the imperfections which existed in my early treatment.

M. C., 6-para, aged 34, was admitted on the morning of November 11, in labour; she was deeply jaundiced and oedematous, with marked albuminuria; her aspect was dull and lethargic. The case was diagnosed as uraemia; milk and water in large quantities to drink and saline purgatives were prescribed. At 8.30 p.m. of the same day she delivered her-

self naturally of a stillborn but fully developed child; she slept well that night, but on the following morning complained of headache and dimness of vision. The oedema and jaundice increased. The bowels were moved by means of a large enema, and a saline enema was injected and retained as desired. A slight fit took place at 2 p.m., and was followed by a severe one at 5 p.m., with a third of less severity in ten minutes' time. The patient never recovered consciousness, and died in profound coma on the night of the 14th, just forty-four hours after the last convulsion, and sixty-six hours after delivery. Her temperature rose to 103° , with pulse of 120, immediately after her first fit, and remained at these points to the end. Her urine was high-coloured, considerably diminished in quantity, and loaded with albumen.

A. C., 1-para, aged 24, admitted September 18, 1907; eclampsia. A fit occurred just as the baby was being born; it was very severe, and lasted ten minutes, and was followed by another in an hour's time. Within the next four hours she had two more fits. A fifth occurred nine hours after delivery; from this the patient recovered, and her condition seemed very good, but eleven hours after delivery the sixth took place, and in this she died before the Assistant Master could be summoned. Child alive. No autopsy was permitted.

M. K., 9-para, aged 35, admitted May 25, 7.45 p.m., with a history of five fits. A sixth took place immediately she reached the hospital, and two more followed this at intervals of half an hour. The patient was deeply comatose, and labour did not start until four hours after admission. Four hours later she delivered herself of a full-term, stillborn child. I saw her before I retired to bed, and then considered her condition in every way favourable. She showed distinct signs of regaining consciousness, urine was being secreted, and her pulse was strong. It was, therefore, with feelings akin to dismay that I learnt on going my rounds in the morning that the patient had died suddenly at 8.25 a.m., twenty-five hours after delivery, and that my assistant had only just time to be called and observe her condition before the fatal termination. No further eclamptic seizures had taken place, and all who saw her concur in stating that she became deeply cyanosed, with swollen tongue, and died in apparently a choking condition.

M. R., 4-para, aged 32, admitted May 2, 1907. Three fits before admission. Eleven hours after admission she delivered herself naturally of a dead child, and during these hours had

five fits; two fits after delivery. Consciousness returned twenty-one hours after delivery, but her breathing remained difficult, and cyanosis was marked. On the evening of the third day after admission respirations became rapid and laboured, with weak pulse, and the patient fell into an unconscious state and died in two hours. Thus forty-eight hours had intervened between the last fit and death. No autopsy was permitted.

S. A. H., aged 32 years, 1-para, admitted January 29, 1908; delivered January 31, 1908. History of six or seven fits before admission. Had seven fits between admission at 6.25 p.m. and 7.30 a.m. of January 30. Improvement continued during next day, when labour started, and she delivered herself at 10.30 p.m., January 31. For some hours previous to delivery the patient began to show signs of circulatory and respiratory failure, which continued after delivery, becoming progressively worse in spite of free stimulation. The patient died at 4 a.m., February 1, 1908, forty-four and a half hours after the last convulsion and seventy-four hours after delivery. Treatment consisted in washing out the stomach and bowel, morphine, purgation, bleeding, transfusion, and stimulation.

Thus two of these patients died from asphyxia during a fit, an accident that can and should be avoided. Of the others, two recovered partial or entire consciousness, with complete cessation of convulsions, establishment of urinary secretion, and birth of their infants, yet secondary toxæmia with collapse supervened, whilst the remaining patient did not develop convulsions until milk in large quantities was administered to her. What, then, I ask, was the cause of this partial recovery with relapse? The only reply I can make is that improvement slowly but gradually took place during the starvation period. The factor operating adversely was the milk or whey given when consciousness or the power to swallow was re-established.

But it was not the fatal cases alone which convinced me of the harmfulness of milk and the impropriety of leaving patients to the entire charge of probationer nurses. Many of the patients who recovered illustrated the same truths, and led me and my assistants to the practical conclusions which are embodied in this paper—conclusions which have proved

so satisfactory that I can now show a continuous series of twenty-nine cases extending over a period of two years and nine months with no maternal mortality. In my last year I caused careful records to be kept of the effect of the administration of milk on convalescents, and give details of two cases to illustrate it.

L. C. had eight *ante-partum* convulsions, followed in forty-two hours by forceps delivery. She was conscious for forty-one hours before delivery, which occurred at 6.55 p.m. on March 17, 1910. Two hours after delivery she was given 1 oz. of milk, and received 4 pints in all within the next twenty-eight hours. At 1.30 a.m. on March 19 the patient showed every sign of severe intestinal toxæmia—a rapid small pulse, marked abdominal distension, sweating, and mental aberration amounting almost to delirium. She had one or two irregular convulsions, which resembled hysterical manifestations more than eclamptic fits. At 2.30 a.m. she had a severe convulsion, followed by two more within an hour, after which her pulse rose to 170, and was for a time so fast and small as to be practically uncountable. A large quantity of very sour curd was washed out of the stomach, and thorough rectal lavage brought away considerable faecal matter and flatus. Following this she recovered consciousness for thirty-six hours, during which time she got no food.

Then followed the third group of convulsions, amounting in all to more than 100. Her bowels had not moved for thirty-one hours; abdominal distension was again a marked feature.

A. R. had four *ante-partum* fits, followed in twelve and a half hours by forceps delivery, at 1.30 p.m. on September 15, 1910, after which she regained consciousness in six hours. Sixty-nine hours after regaining consciousness she was given 1 oz. of milk, 5 oz. at the end of one hour, and again 5 oz. in three hours. Half an hour after the last dose there was a recurrence of severe convulsions—three within an hour. They yielded to our usual treatment, and she remained free from them for another thirty-six hours. She was conscious for thirty-three hours. Four ounces of whey was then given, and within three and a half hours following this another group of five convulsions occurred.

I now hold that all toxæmic patients should be treated as eclamptic, even though they have not developed fits. The

lateral position must be insisted on for the removal from the throat of mucus; inhalation of oxygen and artificial respiration should be undertaken whenever the patient shows any sign of respiratory obstruction. Food of any kind is deleterious, and should be withheld for long periods after consciousness is regained.

On admission my patients were given $\frac{1}{2}$ grain of morphine hypodermically; the stomach was washed out, and a purgative poured through the tube. There is no importance attached to the nature of the purgative; it must be efficient.

Formerly 1 to $1\frac{1}{2}$ pints of fluid were left in the stomach, but this has been omitted latterly, as occasionally it was found to regurgitate into the mouth, and was also open to the fear that by its weight and position it might embarrass the heart. After the stomach is washed out the catheter is passed and the urine withdrawn, measured, and examined. The patient is then turned on her side and the rectum and lower bowel thoroughly washed out with a solution of sodium bicarbonate through a long rubber tube. If an enema has been given immediately on admission it will have some effect in softening faecal masses, and will probably make subsequent rectal washing more effective. Lavage must be very thorough; a pint to a pint and a half of fluid is used at a time, and the procedure continued till a large amount of faecal matter has been washed out. Gallons of water may have to be used before these masses are sufficiently softened. When once the bowel is cleared 1 to $1\frac{1}{2}$ pints of solution of sodium bicarbonate ($\frac{1}{2}$ drachm to a pint) are left in the rectum.

If, in spite of this, the urine remains scanty, submammary infusion of a similar solution is practised; these injections may amount to from 1 to 2 pints.

We formerly employed saline solution for the purpose, but the fear that salt would add to the difficulty of elimination caused us to substitute plain water, which we finally discarded, because of the theoretical fear that laking of the blood would result. On theoretical grounds this substitution appears to be justified, and we have no reason to regret its employment. Linseed-meal poultices to the loins help to increase renal activity; they are changed every three hours. Mucus that

forms in the mouth falls into the cheek and is wiped out with moist cotton-wool. I think it is a great mistake to wipe mucus from the pharynx, particularly when it requires the introduction of a gag. Such manipulation irritates the patient to quite an unnecessary degree, and is one of the many causes of spasmodic choking.

It is a grave error of treatment to leave a patient in the charge of one or two probationer nurses. They cannot be trusted or even expected to take the initiative in resorting to measures to restore an asphyxiated patient. A member of the hospital staff should always be in attendance. This is frequently a difficulty, but must not be considered an impossibility by those who realize its importance. If mucus forms in the throat and spasm of the glottis occurs, the attendant is instructed to draw the patient's head and shoulders over the side of the bed and at the same time to turn the face down towards the floor. This can be facilitated by grasping the hair. It is immediately followed by an outpouring of bloody mucus from the nose and mouth, with rapid relief of symptoms. Oxygen and artificial respiration are important aids in the re-establishment of breathing.

The patient is disturbed as little as possible for twelve hours, although if the bowels have not moved treatment is persisted in every eight hours to effect this. The catheter, too, is passed every eight hours. Morphine, beginning with $\frac{1}{2}$ -grain doses and followed by $\frac{1}{4}$ -grain doses every two hours, is given whilst the fits persist until 2 grains have been administered within twenty-four hours. At times doses as moderate as these produce surprising slowness of the respirations. When they fall to six or seven per minute it is an indication that enough morphine has been given. Atropine or scopolamine may with advantage be substituted, together with artificial respiration. Should consciousness be restored sufficiently to permit of swallowing, the patient is encouraged to take frequent draughts of hot or cold water, and until recovery is complete all forms of nourishment should be withheld. As to the lines of treatment to be avoided:

Accouchement forcé comes first. Many of our patients recovered from eclampsia and carried their children for con-

siderable periods afterwards. I do not like to see labour occurring during the seizures, but, should it do so, the os rapidly dilates. When fully dilated, delivery may be expedited with forceps, but, as a matter of fact, I have seldom found forceps application necessary. Delivery is usually easy, and there is considerable difficulty in conducting an aseptic artificial delivery in these cases; for this reason, if for no other, spontaneous delivery is preferable. I would not permit a patient to die undelivered, and if death threatened would perform vaginal Caesarean section.

Vapour baths and other means to promote diaphoresis are obviously improper procedures. Eclamptics are suffering from paucity of fluid in the circulation, and this in spite of their tissues being possibly solid with oedema. What is greatly wanted is a less saturated condition of the blood, and it is impossible to suppose that profuse sweating can have any other action than to increase this abnormality. Only a minimum of toxins (if any) can be eliminated by sweating.

Chloroform is closely associated in its effects on the liver and other organs with the eclamptic poisons. I have long learnt to dread this anaesthetic in all toxæmic conditions. Stroganoff, however, thinks that his patients benefit by the quiet induced with very small doses of chloroform (12 to 15 drops) during any manipulative interference, and if by this dose he facilitates the passage of the stomach tube, or lessens the struggle during submammary infusion, he has achieved a great advantage at a cost which I cannot think is excessive. Had I known of his method, it would certainly have been tried by me. It will not, I think, materially alter statistics, but it should be remembered as a possible aid to treatment.

In conclusion, I do not for one moment suggest that all patients will recover from eclampsia in the future. Fits—epileptic, uræmic, or eclamptic—have always an element of danger apart from the actual disease. The resultant high blood pressure may cause hæmorrhages into the brain, liver, or abdominal cavity. Such an occurrence has recently been reported by the present Master of the Rotunda Hospital, who, on opening the abdomen preparatory to the performance of Caesarean section, found it filled with blood.

No other disease better repays the attendant for personal supervision. There is no detail of treatment that does not require a careful practical training in its carrying out. Even in passing the stomach tube special skill is requisite. Bowel lavage, submammary infusion, and the clearing of mucus from the pharynx are all highly technical procedures, a perfect mastery of which should not be assumed on the part of those placed in charge.

Patients with profound toxæmia make a tedious recovery. Elimination is always slow. Heart failure may supervene although no new poison may be added to the blood. For these reasons a certain number of deaths must be expected. Nevertheless, it is impossible any longer to pretend that the treatment of eclampsia is either empirical or useless.

SCOPOLAMINE-MORPHINE ANAESTHESIA IN LABOUR

IN the last few years great interest has centred around the administration of scopolamine during labour. At the suggestion of the Master of the Rotunda Hospital (Dr. E. Hastings Tweedy), we decided to study the subject, and propose to give our experience in a series of selected cases—namely, one hundred primiparae. We considered the tests of such a comparatively new anaesthetic would be of more statistical value if primiparae only were selected. The average duration of labour is longer than in multiparae, and the occurrence of unexpected abnormalities, such as *post-partum* haemorrhage and adherent placenta, less common.

It may be asked why we present a record of only 100 cases since we began our study in September, 1908. Our answer is that we only administered scopolamine when the labour ward was quiet and comparatively empty, so that strict attention could be paid to mother and child. We excluded all patients who were quiet and undemonstrative, and all those who came in well advanced in labour.

We began with a dosage of scopolamine hydrobromide $\frac{1}{500}$ grain, and morphine sulphate $\frac{1}{4}$ grain. After trying various amounts we fixed on scopolamine $\frac{1}{500}$ grain and morphine $\frac{1}{8}$ grain as a safe and efficient dose. When repeated the morphine is omitted. Merck's preparation was used throughout. It is supplied in $\frac{1}{60}$ grain tablets. As we always made up a fresh solution for each dose, it was found convenient to use a half tablet each time. This accounts for our dose of $\frac{1}{120}$ grain instead of $\frac{1}{60}$ grain as usually advised. Other makers' preparations are, no doubt, equally good, but many contradictory symptoms occur from using different preparations of apparently the same drug. Therefore, we thought it advisable to confine ourselves to one trustworthy preparation.

When dealing with a new procedure it is natural to follow authoritative teaching, and at the start we based our method of administration on Professor Krönig's paper, read before the British Medical Association meeting in 1908. In some of our early cases we unwittingly departed from accepted doctrines, and it was from these cases that we think we obtained some of our most valuable information.

In recording our cases we have paid attention to the following conditions:—

1. The power of the drug to relieve pain.
2. Its influence on the force of the pains.
3. Its effect on the child, and particularly if this were manifested to a greater degree when delivery quickly followed the administration of the scopolamine.
4. The necessity for watching the patient.
5. The occurrence of abnormalities, such as delayed labour, forceps delivery, lacerated perineum, retained placenta, and *post-partum* haemorrhage.

I.—THE POWER OF SCOPOLAMINE TO RELIEVE PAIN.

In previous papers it has been suggested that complete amnesia with unconsciousness of pain is desirable. As a rule, this is only obtained and maintained by repeating the dose every two hours for two or three doses. We are satisfied with a slighter effect, and we consider the purpose of the drug fulfilled if the patient sleeps between the pains, waking up with more or less demonstration during the height of the contraction, and again falling to sleep when the pain is over. One dose sometimes suffices to cause somnolence, and often deep sleep during, as well as between, pains. We endeavoured to select patients that were particularly noisy and demonstrative, in order to be able to say definitely how much effect the drug had on the sensibility of pain.

The results were as follows:—Ten women exhibited complete analgesia, having no knowledge of pain even when the child was born.

In 57 cases there was a marked effect; sleep between and often during the pains, with great decrease in suffering.

In 20 cases the effect was fairly good as regards relieving the pain to a certain extent, but the patients did not sleep at all.

In 13 cases there was no effect whatever. In 4 of these the drug was lost because of rapid vomiting. Eight received too small a dose; in none of them was it repeated. One patient, after two doses by mouth and one hypodermic injection of $\frac{1}{120}$ grain, $\frac{1}{80}$ grain, and $\frac{1}{80}$ grain respectively, showed no result.

Method of Administration.—Of the 10 patients exhibiting complete amnesia, 3 received one dose by mouth, 6 received one dose hypodermically, and 1 received two doses hypodermically. After mouth administration the shortest interval to elapse before delivery was an hour and a half, the longest six hours, and the average three and a third hours. The shortest interval after hypodermic injection was an hour and a half, the longest fifteen hours, and the average six hours.

Of the total number of cases, 37 received the drug by mouth alone; 5 of these vomited. This cannot be said to result from the scopolamine, as other sedatives—for example, chloral, bromide, or laudanum—are often vomited when given by mouth during labour. Therefore, hypodermic injection is only preferable when the patient shows a tendency to vomit, otherwise mouth administration is the pleasanter method. The results we obtained by the latter method were in every way as satisfactory as by the former.

II.—THE INFLUENCE OF THE DRUG ON THE UTERINE CONTRACTIONS.

The rules which we intended to follow in administration were that the membranes should be unruptured, the foetal heart normal, the os not more than three-quarters dilated, and the pains of normal frequency, strength, and duration—that is, pains every five to seven minutes, lasting forty-five seconds or more, the uterus contracting firmly with each pain. These data are observed by palpating the uterus for three or four successive pains. If only these cases are considered suitable for scopolamine there must be omitted many cases of primary uterine inertia which are a source of annoyance and

worry to the doctor and anxiety to the patient's relatives. To ensure good statistical results these patients should be omitted, but the atmosphere of quiet and comfort that is induced by the use of scopolamine makes them eminently suitable cases for its use. This we discovered in one or two of our early cases which at the time of administration we thought to be in strong labour, because of their noisy demonstrations. Scopolamine unmasks the true condition, and the relief of suffering with almost total disappearance of pains is disconcerting if the precaution of palpating the uterus before administering the drug is neglected. But contractions of ten to fifteen seconds' duration, with an outcry lasting one to two minutes, and slow dilatation of the os, enable one to recognize inertia. If scopolamine is used in these cases the delay should not be attributed to the drug. Opium and chloral have a somewhat similar effect.

For the sake of comparison, we collected a series of 100 consecutive primiparae from the first of the year, excluding those with eclampsia, macerated children, abnormal presentations, and *ante-partum* haemorrhage. In these cases the average duration of labour was 17 hours. The longest labour was 107 hours, and the shortest 2 hours. In the cases that received scopolamine, the average length of labour was 31 hours. The longest labour lasted 71 hours, and the shortest $5\frac{3}{4}$ hours, giving an average of 14 hours' longer labour in the scopolamine patients.

This prolongation of labour can be explained by the inclusion of the cases of inertia mentioned, and the fact that we endeavoured to choose those patients least capable of bearing pain—in other words, those bound in any event to have a more or less prolonged labour. In addition, the 100 consecutive cases include a large number of patients who were admitted too far on in labour, or too quiet to need scopolamine. They also include a number of cases of rapid labour common enough in primiparae, but excluded as unsuitable for scopolamine. If we had selected 100 cases which would have been suited for scopolamine, but did not receive it on account of the crowded condition of the labour ward, the discrepancy would probably not be so marked.

III.—THE EFFECT ON THE FOETUS.

Much has been written about the danger to the foetus, but from our cases we conclude that this has been exaggerated. One child was born in a condition of apnoea. Its birth occurred four and a half hours after a hypodermic injection of $\frac{1}{500}$ grain scopolamine and $\frac{1}{4}$ grain morphine. This effect is much more likely to have been due to morphine than scopolamine. It revived after hot baths and Schultze's artificial respiration. Two children were born dead, both delivered by forceps after delay in the second stage. Whenever a child dies as a result of delay in the second stage, it is undoubtedly due to an error in technique and should not be laid at the door of scopolamine. The drug was administered fifteen and twenty-six hours respectively before delivery, one hypodermic injection to each patient. These were obviously cases of inertia, and this and not the scopolamine was the cause of death. In the other series there were also two deaths of children during labour, one delivered by forceps and one naturally.

IV.—NECESSITY FOR WATCHING THE PATIENT.

The statement has been made that the doctor must continuously watch a patient who is under the influence of scopolamine. If this be true, it immediately condemns the treatment in the eyes of most practitioners. But such care is unnecessary. The nurse should be instructed to keep a watch on the perineum for signs of pressure, as occasionally delivery occurs unexpectedly. If the patient is asleep she should be kept on her side to prevent the possibility of the tongue falling back, an occurrence common to all forms of anaesthesia. Abnormal mental effects were observed only in two cases, one patient becoming excited and talking incoherently for a short time. The other patient had an almost painless delivery, and about an hour later, after having been quiet and rational since delivery, got out of bed because she wished to use the bed-pan. She offered no resistance, and returned to bed immediately when told to do so by the nurse who was in the room. She said she knew what she was

doing, but had an irresistible impulse to leave her bed. She was quiet afterwards. There was no case of actual delirium.

A darkened room is supposed to be necessary for good results, but we never purposely kept the room dark, and we consider to do so would be a disadvantage, as it might possibly interfere with the nurse's watch for the complications indicated—that is, unexpected delivery and falling back of the tongue.

V.—THE OCCURRENCE OF SUCH ABNORMALITIES AS LACERATION OF THE PERINEUM, FORCEPS DELIVERY, RETAINED PLACENTA, AND POST-PARTUM HAEMORRHAGE.

It might have been expected that laceration of the perineum would be more frequent in patients delivered while under the influence of scopolamine because the absence of pain enables the patient to bear down more vigorously. There were 59 lacerated perineums, which is 14 per cent. more than our usual yearly average, 45 per cent.; but in the 100 primiparae we took for comparison there were 65 lacerations.

Forceps were applied nineteen times for delay in the second stage, as compared with nine times in the other series. This is again in most part due to the selection of the cases, and the inclusion of cases of inertia. Occasionally we have noticed delay in the second stage resulting from the patient not bearing down with uterine contractions; the absence of pain, instead of making the abdominal muscles act more vigorously—that is, the usual action—caused cessation of voluntary effort. Keeping the patient awake, encouraging her to bear down and pressing on the fundus were sufficient to effect delivery.

Post-partum haemorrhage occurred twice in the scopolamine series, once after chloroform and forceps, once when the membranes were retained. The other series showed one *post-partum* haemorrhage and one manual removal of an adherent cotyledon remaining after easy expression of the placenta at thirty minutes. The *post-partum* haemorrhage occurred after the administration of chloroform for the application of forceps.

The average length of the third stage was thirty-five minutes in the scopolamine cases and thirty-three minutes in

the others, the longest and shortest third stage in the former series being ninety minutes and ten minutes respectively, and in the latter series one hundred and twenty minutes and ten minutes. Expression caused delivery of the placenta in every case.

CONCLUSIONS.

Our conclusions, so far as may be judged by 100 cases, are:—

1. Scopolamine need not be given in larger doses than $\frac{1}{120}$ grain.

2. In the majority of cases it may be given advantageously by the mouth.

3. It is undesirable to keep patients in a darkened room whilst under its influence.

4. The patient should be carefully watched. This can be done equally well by the nurse as by the doctor.

5. No ill effects to mother or child need be expected to follow the rational administration of scopolamine.

6. Whilst its chief indication will be found during the first stage of labour, the fear of rapid delivery following its use is not a contra-indication.

In conclusion, we wish to thank the Master, Dr. Hastings Tweedy, for permission to publish our results and also for much advice and help in our investigations and case reports.

J. R. FREELAND.

BETHEL A. H. SOLOMONS.

VACCINES IN PUERPERAL SEPSIS

VACCINES have proved of value in all forms of puerperal sepsis, whether local or general, but they are to be employed together with, not instead of, whatever surgical or other treatment may be considered advisable. It is necessary that the nature of the infecting organism should be discovered by examination of the lochia taken, with precautions against contamination, from the uterus. In most cases the organism is either the *streptococcus* or the *staphylococcus aureus*. Having detected the organism, a stock vaccine thereof should be at once administered. Meanwhile, a vaccine, made from the strain separated from the patient herself, should be prepared. If the stock vaccine gives satisfactory results, as shown by a reduction of the pulse and temperature to normal, and general improvement in the patient's condition, there is no need to make the auto-vaccine. In the case of streptococcal infections the first dose should be 5,000,000 cocci, in the case of staphylococcal infections 25,000,000. Further doses are to be given at intervals of forty-eight hours. The usual result is a definite drop in the pulse and temperature, occurring in from twelve to thirty-six hours after the injection. In many cases both pulse and temperature reach normal, and it may be assumed that the dose given was suitable. If, however, the pulse and temperature come down but do not reach normal, the dose given at the second injection should be twice that at the first. A further increase may be necessary, but in no case should one exceed a dose of 20,000,000 streptococci or 100,000,000 staphylococci. The treatment is to be kept up until one dose has been given after pulse and temperature have become normal. The action of streptococcal vaccine is aided by the simultaneous injection of anti-streptococcus serum.

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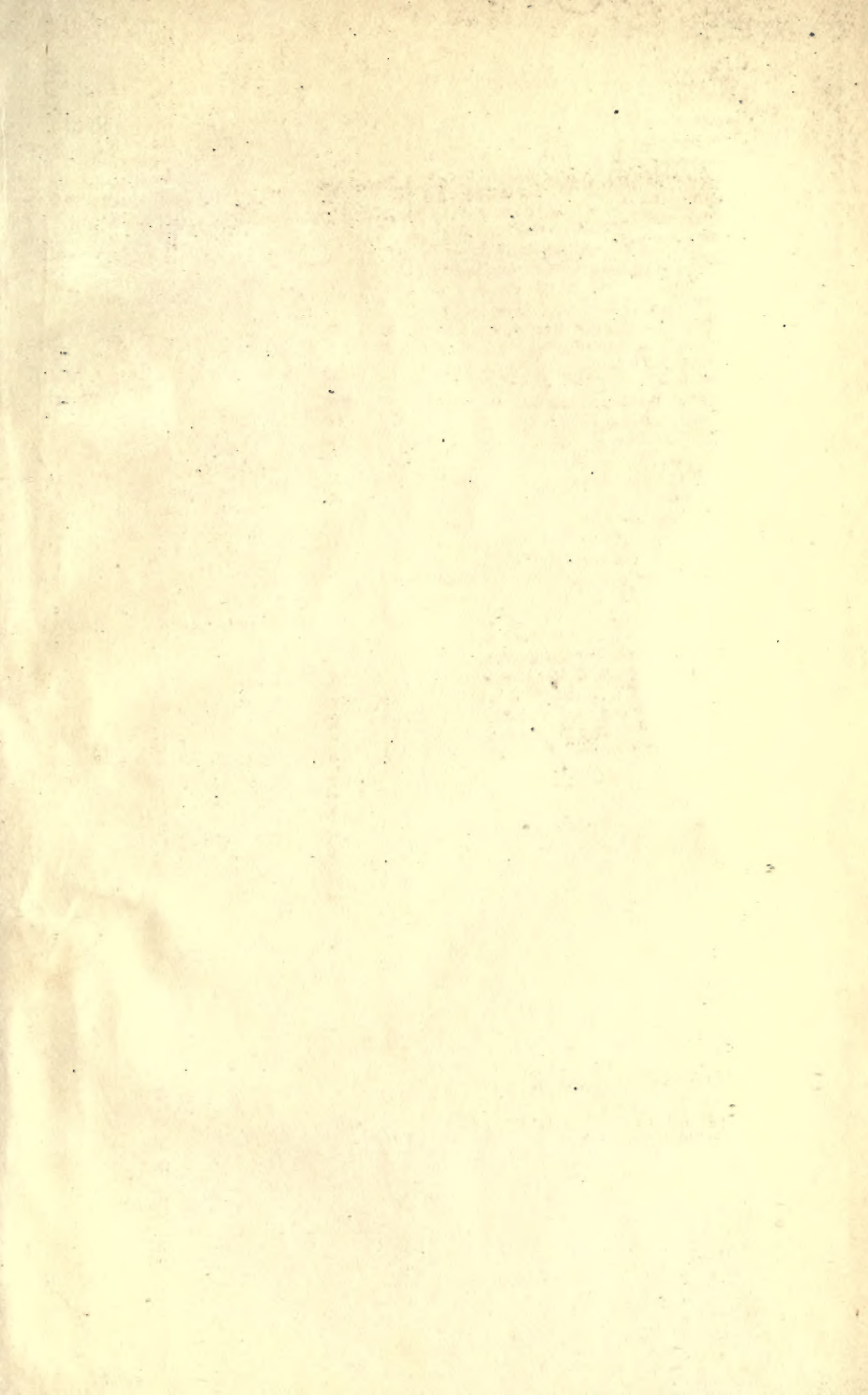
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- 63 - *Adiantum canaliculatum* ✓
- 3 - *Leuc. oregon.* ✓
- *Asplen. adnigrum* ✓
- *Tub. ...* ✓
- 8 *Cor. ...* ✓
- *Ud. deg. filinet.* ✓
- 6 - *Cam. ...* ✓
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